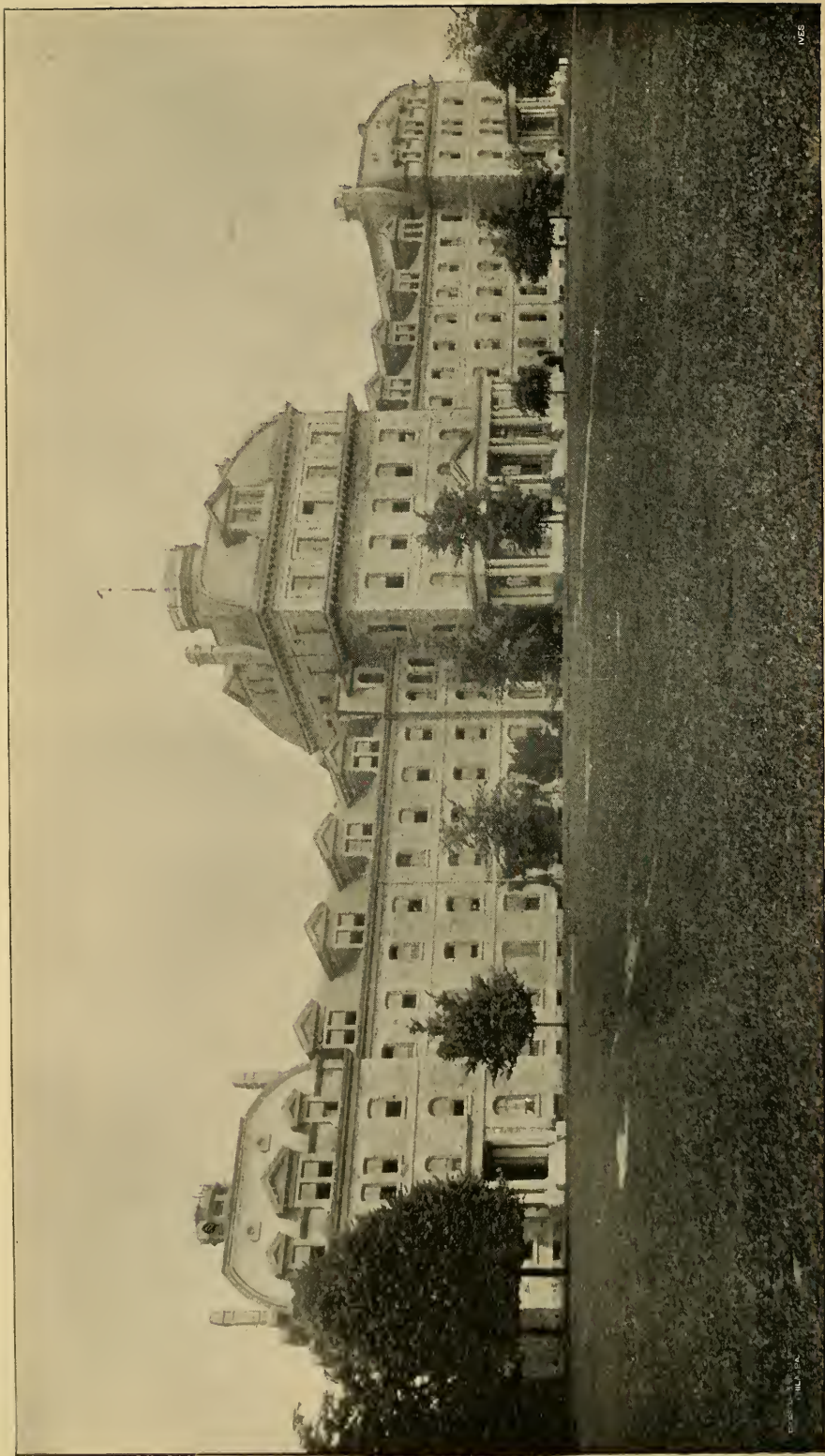


# SWARTHMORE COLLEGE.

1889-90.



SWARTHMORE COLLEGE

Twenty-Second

Annual Catalogue

OF

Swarthmore College

Swarthmore, Pa.

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1890-91


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PHILADELPHIA  
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1891

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SWARTHMORE COLLEGE  
(REAR VIEW)

# Calendar.

1890-91.

1890.	Ninth Month, 9th,	Third-day,	Meeting of the Board of Managers.
"	Ninth Month, 9th,	Third-day,	New Students arrive.
"	Ninth Month, 10th,	Fourth-day,	Examinations for Admission.
"	Ninth Month, 11th,	Fifth-day,	Old Students return.
"	Ninth Month, 12th,	Sixth-day,	Regular Exercises begin.
"	Twelfth Month, 1st,	Second-day,	Meeting of the Board of Managers.
"	Twelfth Month, 2d,	Third-day,	<i>Annual Meeting of the Stockholders.</i>
"	Twelfth Month, 2d,	Third-day,	Meeting of the Board of Managers.
"	Twelfth Month, 20th,	Seventh-day,	Winter Recess begins.
1891.	First Month, 5th,	Second-day,	Students return.
"	First Month, 6th,	Third-day,	Regular Exercises begin.
"	First Month, 31st,	Seventh-day,	First Semester ends.
"	Second Month, 2d,	Second-day,	Second Semester begins.
"	Second Month, 9th,	Second-day,	Commencement Appointments announced
"	Third Month, 10th,	Third-day,	Meeting of the Board of Managers.
"	Third Month, 28th,	Seventh-day,	Spring Recess begins.
"	Fourth Month, 6th,	Second-day,	Students return.
"	Fifth Month, 1st,	Sixth-day,	Graduating Essays due from Senior Class.
"	Fifth Month, 25th,	Second-day,	Senior Examinations begin.
"	Sixth Month, 1st,	Second-day,	Senior Examinations completed, and the results announced.
"	Sixth Month, 8th,	Second-day,	Final Examinations begin.
"	Sixth Month, 12th,	Sixth-day,	} Examinations for Admission.
"	Sixth Month, 13th,	Seventh-day,	
"	Sixth Month, 15th,	Second-day,	Meeting of the Board of Managers.
"	Sixth Month, 15th,	Second-day,	Class-Day Exercises.
"	Sixth Month, 16th,	Third-day,	COMMENCEMENT.
"	Ninth Month, 8th,	Third-day,	Meeting of the Board of Managers.
"	Ninth Month, 8th,	Third-day,	New Students arrive.
"	Ninth Month, 9th,	Fourth-day,	Examinations for Admission begin.
"	Ninth Month, 10th,	Fifth-day,	Examinations for Admission completed, and Old Students return.
"	Ninth Month, 11th,	Sixth-day,	Regular Exercises begin.
"	Eleventh Month, 30th,	Second-day,	Meeting of the Board of Managers.
"	Twelfth Month, 1st,	Third-day,	<i>Annual Meeting of the Stockholders.</i>
"	Twelfth Month, 1st,	Third-day,	Meeting of the Board of Managers.
"	Twelfth Month, 23d,	Fourth-day,	Winter Recess begins.
1892.	First Month, 4th,	Second-day,	Students return.
"	First Month, 5th,	Third-day,	Regular Exercises begin.

# Corporation.

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## OFFICERS.

---

### Clerks.

GEORGE W. HANCOCK,  
716 Chestnut Street, Philadelphia.

FANNIE WILLETS LOWTHORP,  
Trenton, N. J.

### Treasurer.

ROBERT BIDDLE,  
507 Commerce Street, Philadelphia.

### Board of Managers.

*Term expires Twelfth Month, 1891.*

JOSEPH WHARTON,  
P. O. Box 1332, Philadelphia.

WILSON M. POWELL,  
324 W. 58th Street, New York.

M. FISHER LONGSTRETH,  
Sharon Hill, Delaware Co., Pa.

MARY C. CLOTHIER,  
Wynnewood, Pa.

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309 Chestnut St., Trenton, N. J.

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335 W. 18th Street, New York.

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Swarthmore, Pa.

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314 Vine Street, Philadelphia.

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815 Arch Street, Philadelphia.

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*Term expires Twelfth Month, 1893.*

JOHN T. WILLETS, 303 Pearl Street, New York.	JANE P. DOWNING, 1613 Race Street, Philadelphia.
CHARLES M. BIDDLE, 507 Commerce Street, Philadelphia.	SARAH H. POWELL, 324 West 58th Street, New York
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*Term expires Twelfth Month, 1894.*

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## Secretary.

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1890-91.

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Dean.

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PROF. ARTHUR BEARDSLEY.

PROF. SUSAN J. CUNNINGHAM.

PROF. WILLIAM PENN HOLCOMB.

PROF. BENJAMIN SMITH.

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PROF. GEORGE A. HOADLEY.

PROF. GERRIT E. H. WEAVER.

PROF. SPENCER TROTTER.

PROF. MILTON H. BANCROFT.

WILLIAM J. HALL,  
Superintendent.

---

\* BY-LAWS.—“The President, Dean, and such of the resident Professors and others as may be elected by the Board, shall constitute the Faculty. They shall hold regular meetings, arrange the course of study, determine the qualifications for admission and for graduation, decide upon rules of order, and determine all questions pertaining to the discipline or instruction, subject to the approval of the Executive Committee, to whom they shall report monthly.”

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Professor of Natural History, and Lecturer on Physiology and Hygiene to the Young Men.

MILTON H. BANCROFT,

Professor of Art and of Mechanical Draughting.

---

\* Arranged, with the exception of the President, in the order of appointment, as : Professors, Assistant Professors, and other Instructors.

† William Dudley Foulke, A.M., was elected President of the College, Twelfth month 1st, 1890, to succeed Prof. William H. Appleton, who had declined to continue as permanent President. President Foulke will enter upon his duties about Third month 1st, 1891.



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Professor of the German Language and Literature.

FERRIS W. PRICE, A.M.,

Isaac H. Clothier Professor of the Latin Language and Literature.

MYRTIE E. FURMAN, B.Ö.,

Assistant Professor in charge of Elocution.

MARY J. MURPHY,

Director of Physical Culture for the Young Women.

J. K. SHELL, M.D.,

Director of Physical Culture for the Young Men.

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Lecturer on Physiology and Hygiene to the Young Women.

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Assistant in Chemistry.

MARIA DAVIS,

Assistant in Drawing.

MARY D. PRATT, A.B.,

Assistant in Mathematics.

JENNIE F. WADDINGTON, B.S.,

Assistant in Biology.

WILLIAM McCLELLAN,

Assistant in Engineering.

ESTHER T. MOORE, A.B.,

Secretary to the President, and Registrar.

SARAH M. NOWELL,

Librarian.

# Students.

## Graduate.

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## Undergraduates.

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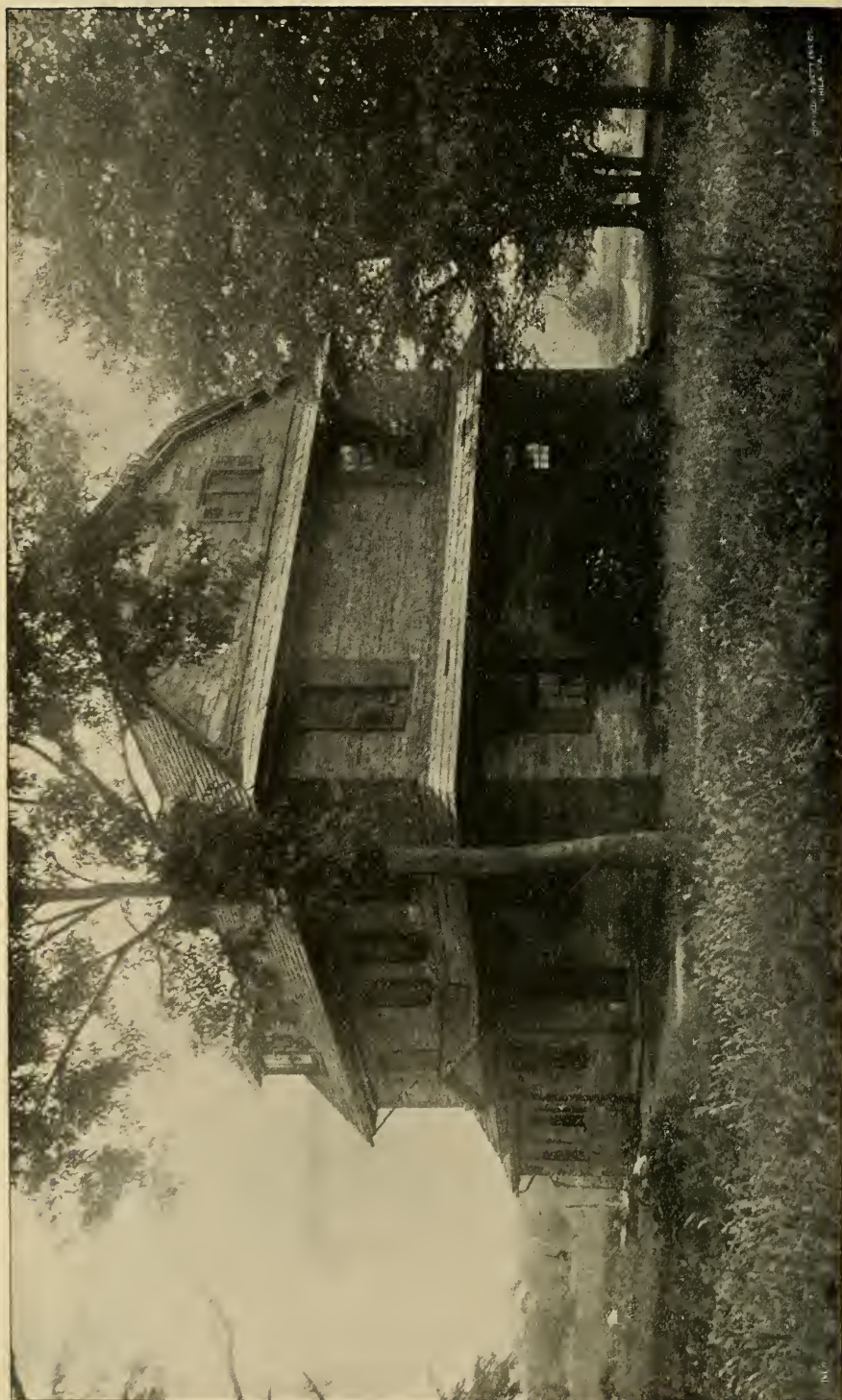
## JUNIOR CLASS.

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## SOPHOMORE CLASS.

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THE WEST HOUSE  
BIRTHPLACE OF BENJAMIN WEST  
PROFESSOR'S RESIDENCE

STUDIO OF J. H. KELLEY  
PHILA. PA.



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CHARLES L. WARNER . . . .	<i>Engineering</i> . . . .	Titusville, Pa.
GEORGE W. WARNER . . . .	<i>Engineering</i> . . . .	Titusville, Pa.
WALTER L. WATSON . . . .	<i>Irregular</i> . . . .	Scranton, Pa.
LILA K. WILLETS . . . .	<i>Arts</i> . . . .	Roslyn, N. Y.
E. NEWLIN WILLIAMS . . . .	<i>Science</i> . . . .	New Hope, Pa.
S. ELLEN WILLIAMS . . . .	<i>Science</i> . . . .	Holicong, Pa.
GENEVIEVE S. ZANE . . . .	<i>Arts</i> . . . .	West Chester, Pa.

## FRESHMAN CLASS.

Name.	Course.	Residence.
MABEL ALEXANDER . . . .	<i>Irregular</i> . . . .	Philadelphia, Pa.
FRANK C. ANDREWS . . . .	<i>Engineering</i> . . . .	Woodstown, N. J.
EMILY Q. ATKINSON . . . .	<i>Irregular</i> . . . .	Three Tuns, Pa.
CHARLES A. BALLINGER . . . .	<i>Irregular</i> . . . .	St. Joseph, Mo.
CAROLINE C. BIDDLE . . . .	<i>Irregular</i> . . . .	Lansdowne, Pa.
EDWIN P. BOND . . . .	<i>Arts</i> . . . .	Florence, Mass.
WARREN G. BOYER . . . .	<i>Arts</i> . . . .	Boyertown, Pa.
LILIAN BRANSON . . . .	<i>Letters</i> . . . .	Clear Brook, Va.
MARY E. BRANSON . . . .	<i>Letters</i> . . . .	Clear Brook, Va.
SUSIE S. BRIGHTSON . . . .	<i>Irregular</i> . . . .	Brooklyn, N. Y.
GERTRUDE C. BROSIUS . . . .	<i>Irregular</i> . . . .	Lancaster, Pa.
WALTER R. BUFFINGTON . . . .	<i>Arts</i> . . . .	Rising Sun, Md.
FRANK D. CLARK . . . .	<i>Engineering</i> . . . .	Hazleton, Pa.
HERMAN CONROW . . . .	<i>Engineering</i> . . . .	Cinnaminson, N. J.
ALTHA T. COONS . . . .	<i>Science</i> . . . .	Deckertown, N. J.
ANNE R. COOPER . . . .	<i>Irregular</i> . . . .	Philadelphia, Pa.
JEWELL FLOWER . . . .	<i>Arts</i> . . . .	Boston, Mass.
JESSIE B. GINN . . . .	<i>Irregular</i> . . . .	Winchester, Mass.
MARTHA L. HARMAN . . . .	<i>Irregular</i> . . . .	Oxford, Ind.
HENRY L. HEULINGS . . . .	<i>Science</i> . . . .	Moorestown, N. J.
HELEN R. HILLBORN . . . .	<i>Arts</i> . . . .	Swarthmore, Pa.
HANNAH D. HILTON . . . .	<i>Arts</i> . . . .	Hartford, N. J.
MARY W. HOLME . . . .	<i>Science</i> . . . .	Salem, N. J.

Name.	Course.	Residence.
IDA HOPE DOEG . . . . .	<i>Irregular</i> . . . . .	Santa Barbara, Cal.
KENT W. HUGHES . . . . .	<i>Science</i> . . . . .	Lima, Ohio.
RACHEL L. HUTCHINSON . . . . .	<i>Irregular</i> . . . . .	Maybeury, West Va.
MARGUERITE INGLIS . . . . .	<i>Irregular</i> . . . . .	New York City.
MARY B. JANVIER . . . . .	<i>Arts</i> . . . . .	Wilmington, Del.
HARRIET M. KENT . . . . .	<i>Arts</i> . . . . .	Swarthmore, Pa.
EDWARD T. LEA . . . . .	<i>Irregular</i> . . . . .	Wilmington, Del.
ROBERT W. LIPPINCOTT . . . . .	<i>Irregular</i> . . . . .	Cinnaminson, N. J.
LILA C. LUNGREN . . . . .	<i>Science</i> . . . . .	Wilmington, Del.
JOHN MAXEY . . . . .	<i>Engineering</i> . . . . .	Bozeman, Montana.
WILLIAM C. MEGARGE . . . . .	<i>Science</i> . . . . .	Moorestown, N. J.
OWEN MOON, JR. . . . .	<i>Science</i> . . . . .	Penn. Valley, Pa.
CHARLES S. MOORE . . . . .	<i>Science</i> . . . . .	May's Landing, N. J.
EDWARD PARRISH . . . . .	<i>Science</i> . . . . .	Brooklyn, N. Y.
MARION D. PERKINS . . . . .	<i>Arts</i> . . . . .	Moorestown, N. J.
MARGARET D. PFAHLER . . . . .	<i>Science</i> . . . . .	Swarthmore, Pa.
JOSEPH M. PUGH . . . . .	<i>Irregular</i> . . . . .	Port Deposit, Md.
MARY H. PYOTT . . . . .	<i>Irregular</i> . . . . .	Rochester, N. Y.
ROWLAND A. RICHARDS . . . . .	<i>Engineering</i> . . . . .	Toughkenamon, Pa.
DAVID B. RUSHMORE . . . . .	<i>Engineering</i> . . . . .	Old Westbury, N. Y.
CHARLES SAXMAN . . . . .	<i>Engineering</i> . . . . .	Latrobe, Pa.
PHILIP SELLERS . . . . .	<i>Engineering</i> . . . . .	Swarthmore, Pa.
MILLIE M. SHATTUCK . . . . .	<i>Arts</i> . . . . .	New York City.
W. WILLIAM SHATTUCK . . . . .	<i>Engineering</i> . . . . .	New York City.
HENRY E. SIMMONS . . . . .	<i>Engineering</i> . . . . .	Moore's, Pa.
ROSE C. SPENCER . . . . .	<i>Arts</i> . . . . .	Havre de Grace, Md.
ESTHER E. SPICER . . . . .	<i>Irregular</i> . . . . .	Fallston, Md.
EDWARD A. STAAB . . . . .	<i>Arts</i> . . . . .	Santa Fé, N. M.
G. EDMUND STRATTAN . . . . .	<i>Engineering</i> . . . . .	Altoona, Pa.
M. VIRGINIA SUDLER . . . . .	<i>Arts</i> . . . . .	Philadelphia, Pa.
CHARLES S. SWAYNE . . . . .	<i>Irregular</i> . . . . .	Kennett Square, Pa.
MARY W. TITUS . . . . .	<i>Letters</i> . . . . .	Old Westbury, N. Y.
STEPHEN M. VARGAS . . . . .	<i>Irregular</i> . . . . .	Nicaragua, C. A.
HOWARD R. WASHBURN . . . . .	<i>Science</i> . . . . .	Chappaqua, N. Y.
MABEL T. WASHBURN . . . . .	<i>Irregular</i> . . . . .	Easton, Pa.

Name.	Course.	Residence.
ESTELLE WATERS . . . . .	<i>Science</i> . . . . .	Philadelphia, Pa.
CARRIE B. WAY . . . . .	<i>Irregular</i> . . . . .	Kennett Square, Pa.
STUART WILDER . . . . .	<i>Engineering</i> . . . . .	Johnson City, Tenn.
ALBERTA WILSON . . . . .	<i>Irregular</i> . . . . .	Bloomfield, Ontario, Can.

## SUB-COLLEGIATE CLASS.

Name.	Course.	Residence.
MARY W. BACON . . . . .	<i>Arts</i> . . . . .	Spring Lake Beach, N. J.
ELIZABETH M. BAILY . . . . .	<i>Science</i> . . . . .	Norristown, Pa.
CLARA BEARDSLEY . . . . .	<i>Arts</i> . . . . .	Swarthmore, Pa.
LLOYD R. BLYNN . . . . .	<i>Arts</i> . . . . .	Philadelphia, Pa.
CORA A. BRIGHTSON . . . . .	<i>Arts</i> . . . . .	Brooklyn, N. Y.
CLIFFORD R. BUCK . . . . .	<i>Science</i> . . . . .	Maybeury, West Va.
JOHN H. BURNLEY . . . . .	<i>Science</i> . . . . .	Lenni, Pa.
IRAD C. BURROUGH . . . . .	<i>Science</i> . . . . .	Baltimore, Md.
ALFRED C. CASS . . . . .	<i>Science</i> . . . . .	Swarthmore, Pa.
WALTER CLOTHIER . . . . .	<i>Arts</i> . . . . .	Wynnewood, Pa.
JOHN L. CONARD . . . . .	<i>Arts</i> . . . . .	Trenton, N. J.
GEORGE E. COOK . . . . .	<i>Science</i> . . . . .	Philadelphia, Pa.
ARLETTA CUTLER . . . . .	<i>Arts</i> . . . . .	Coldstream, Canada.
THOMAS DAVISON . . . . .	<i>Science</i> . . . . .	Pittsburgh, Pa.
FRANCIS J. DEEMER . . . . .	<i>Science</i> . . . . .	Chester, Pa.
MARY B. EYRE . . . . .	<i>Irregular</i> . . . . .	Swarthmore, Pa.
ELMORE C. FAUST . . . . .	<i>Irregular</i> . . . . .	Middletown, Ohio.
SUSANNA M. GARRETT . . . . .	<i>Arts</i> . . . . .	Swarthmore, Pa.
LECLERC GAUNTT . . . . .	<i>Irregular</i> . . . . .	Lumberton, N. J.
MARIA M. FOULKE . . . . .	<i>Science</i> . . . . .	Stroudsburg, Pa.
MARIANNA HALLOCK . . . . .	<i>Arts</i> . . . . .	Brooklyn, N. Y.
CLARA S. KEELEY . . . . .	<i>Arts</i> . . . . .	Spring City, Pa.
ADOLF KRAKAUER . . . . .	<i>Science</i> . . . . .	El Paso, Texas.
ERNESTO LACAYO . . . . .	<i>Irregular</i> . . . . .	Nicaragua, C. A.
C. IRVINE LEIPER . . . . .	<i>Science</i> . . . . .	Chester, Pa.
SAMUEL H. MATTSON . . . . .	<i>Arts</i> . . . . .	Sharon Hill, Pa.
JOEL N. MORRIS . . . . .	<i>Arts</i> . . . . .	Washington, D. C.
HENRY C. S. PARRISH . . . . .	<i>Science</i> . . . . .	Brooklyn, N. Y.
HERMAN S. PETTIBONE . . . . .	<i>Arts</i> . . . . .	Greeneville, Tenn.

Name.	Course.	Residence.
ALFRED E. PFAHLER . . .	<i>Science</i> . . .	Swarthmore, Pa.
ETHEL V. SHATTUCK . . .	<i>Arts</i> . . .	New York City.
FRANK G. SHAVER . . .	<i>Science</i> . . .	Pittsburgh, Pa.
JANE S. SHAW . . . . .	<i>Science</i> . . .	Williamsport, Pa.
ALEXANDER SHREVE . . .	<i>Science</i> . . .	Wrightstown, N. J.
GILBERT T. SMITH, JR. . .	<i>Irregular</i> . . .	Sandy Spring, Md.
HERBERT T. SMITH . . .	<i>Science</i> . . .	Swarthmore, Pa.
PETER A. STEFFIAN . . .	<i>Irregular</i> . . .	San Antonio, Texas.
MARTHA T. VALENTINE . .	<i>Arts</i> . . .	Glen Head, N. Y.
ALLEN K. WHITE . . . . .	<i>Irregular</i> . . .	Lansdowne, Pa.
CHARLES D. WHITE . . . .	<i>Arts</i> . . .	Lansdowne, Pa.
AMIE C. WILLETS . . . . .	<i>Arts</i> . . .	Roslyn, N. Y.



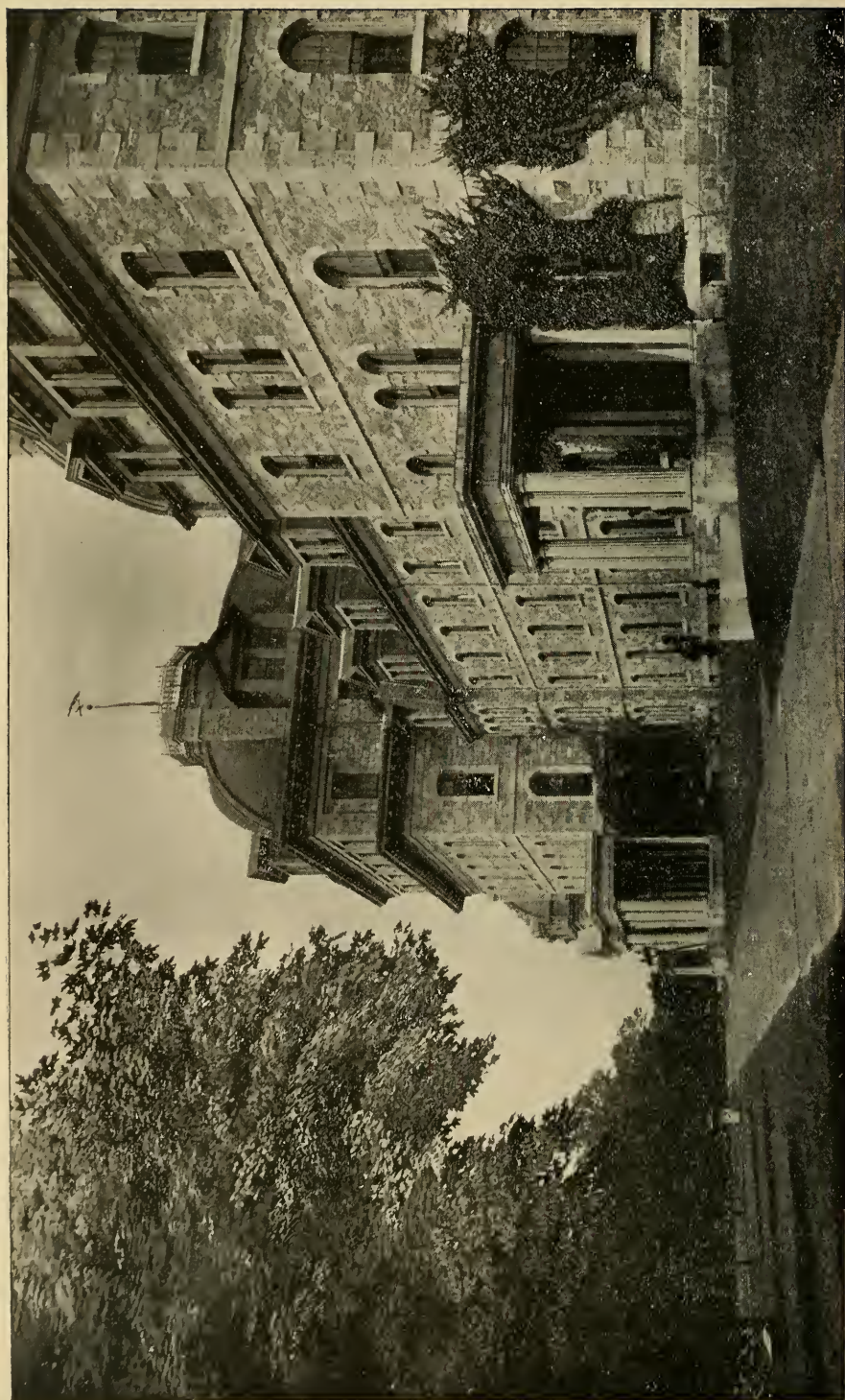
## Summary.

Seniors . . . . .	26
Juniors . . . . .	26
Sophomores . . . . .	51
Freshmen . . . . .	62
Sub-Collegiates . . . . .	41
Total . . . . .	<hr/> 206

## Summary by States.

Pennsylvania . . . . .	86
New Jersey . . . . .	27
New York . . . . .	25
Maryland . . . . .	20
Virginia . . . . .	6
West Virginia . . . . .	6
Delaware . . . . .	5
Massachusetts . . . . .	4
Ohio . . . . .	4
New Mexico . . . . .	3
Colorado . . . . .	2
Missouri . . . . .	2
Tennessee . . . . .	2
Texas . . . . .	2
California . . . . .	1
Illinois . . . . .	1
Indiana . . . . .	1
Maine . . . . .	1
Montana . . . . .	1
Nebraska . . . . .	1
District of Columbia . . . . .	1
Canada . . . . .	3
Nicaragua . . . . .	2
Total . . . . .	<hr/> 206





MAIN BUILDING  
(LOOKING WEST)

## General Information.

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### Buildings and Grounds.

*Swarthmore College* was founded by members of the religious Society of Friends, to provide the children of the Society and others with opportunities for higher education under guarded care. With this object in view, a property of two hundred and forty acres was secured, ten miles from Philadelphia, on the Central Division of the Philadelphia, Wilmington, and Baltimore Railroad. It is accessible by trains from the Broad Street Station, nineteen times daily. About half the land is used for farming purposes, providing milk and vegetables for the College; the remainder is devoted to lawn and pleasure-grounds. Crum Creek, which forms the western boundary of the property, affords facilities for boating, bathing, and skating. The portion of the grounds bordering the stream is of great picturesque beauty. The building site is high, thus securing perfect drainage and pure air and commanding a fine view of the surrounding country for many miles.

*The Principal College Building* is a massive stone structure 348 feet long. It consists of a central building, four stories high, containing public rooms, such as lecture-rooms, museum, library, reading-rooms, parlors, dining-hall, etc. Fire-proof compartments separate this building from the two wings. The latter are each three stories high. The ground-floors are devoted to lecture and recitation rooms; the remaining floors in the east wing contain the dormitories of the young women, and, in the west wing, those of the young men. A number of the instructors reside in the same building with the students, and the relations between them are such that there is comparative freedom from the dangers and temptations ordinarily incident to college life. The buildings are heated throughout by steam, lighted by gas, and thoroughly ventilated.

*The Science Hall* is constructed of stone, in the most durable manner, and was planned with special reference to the work of students in Engineering, Physics, and Chemistry. It has a frontage of 130 feet, and a depth of 64 feet. The basement contains the wood-working shop, the blacksmith shop, and the foundry of the engineering department, and store-rooms. On the first floor are the machine shop and engineering lecture-room, and the chemical and physical laboratories, and on the second floor are the draughting-rooms and the chemical lecture-room.

*The Astronomical Observatory* is especially arranged for purposes of instruction. The plan embraces a central building, supporting the dome, and two wings. There are four rooms: a transit-room, in which is placed an instrument of three-inch aperture, also the mean-time clock; a pier-room, at present utilized as a sidereal-clock room; a work-room, in which is placed a small library of reference-books, the chronograph and chronometer; and the dome, containing the equatorial of six-inch aperture. In connection with this latter instrument, there is a micrometer and a spectroscope. The transit and equatorial were constructed by Warner & Swasey, of Cleveland, and the spectroscope by Brashear, of Allegheny. The equipment is ample for class-work. Connected with the observatory is the Signal Service Station of the State Weather Bureau, fully provided with the necessary meteorological and other apparatus.

*Other Buildings* are a meeting-house, the President's house, the West house (birthplace of Benjamin West, now used as a professor's residence), the house of the Professor of Astronomy, the Farmer's house and commodious farm-buildings, the laundry and bakery, and the boiler-house, containing the sectional boilers for heating and cooking purposes. All these buildings are constructed of stone.

## Libraries and Reading-Room.

*The Libraries* of the College collectively contain 13,914 bound volumes, as follows:

The General Library . . . . .	9,445
Literary Societies' Library . . . . .	3,261
Friends' Historical Library . . . . .	1,208







MUSEUM

Members of the Senior Class are permitted, under proper regulations, to consult the Philadelphia Library, containing 145,000 volumes, and the Mercantile Library, containing 150,000 volumes, as well as the valuable special and technical Libraries in the city of Philadelphia. The General Library is at all times accessible to students. The Librarian will aid students in consulting the Library and in arranging courses of reading.

*Friends' Historical Library*, founded by the late Anson Lapham, of Skaneateles, N. Y., consists of Friends' books, photographs of representative Friends, and manuscripts relating to the Society and its history, and is, upon application to the Librarian, accessible to teachers, students, and members of the household. This collection is stored in a fire-proof apartment, and it is hoped that Friends and others will deem it a secure place to deposit books and other material in their possession which may be of interest in connection with the history of the Society. Such contributions are solicited, and should be addressed to "Friends' Historical Library, Swarthmore, Pa."

*The Reading-Room*, supplied with the leading literary and scientific journals and the prominent newspapers of the principal cities, is open to students at all times except during the regular hours for study and recitation.

*Literary Societies* are maintained by the students. There are two for young men and one for young women. These hold regular meetings for the reading of essays, etc., and for practice in debate. Their Libraries, under their own management, contain over two thousand volumes and are accessible to all students.

A Scientific Society, a Natural History Club, and an Architectural Club are also maintained by the students.

## The Museum.

*The Museum* of the College is strictly a teaching collection, and the specimens from its cases are in constant use in the lectures and laboratories in Natural History; it is growing steadily, but always in the direction of rendering more perfect the means of illustrating the different departments of natural history, and with no intention of making it a collection of curiosities or miscellaneous articles, however interesting they may be in their way.

It includes the following collections:

1. The *Joseph Leidy Collection of Minerals*, the result of thirty years' discriminative collecting by its founder, occupies four large double cases, and consists of exceedingly choice cabinet specimens of crystallized minerals, characteristic rocks and ores, and transparent and opaque models of the various systems of crystallization.

2. The *Collection of Comparative Osteology* consists of a large series of partial and complete skeletons, prepared at Prof. Henry Ward's Natural History Establishment, in Rochester, N. Y., and illustrating the structure of the framework of backboned animals.

3. The *Wilcox and Farnum Collection of Birds* comprises four large double cases of stuffed specimens of native and foreign birds. Nearly all the species visiting this State are represented.

4. The *Frederick Kohl Ethnological Collection* consists of two cases of Indian implements, weapons, clothing, etc., mostly from Alaska.

5. The *C. F. Parker Collection of Shells* is made up of six large cases of choice typical land, fresh-water, and marine shells. These specimens were all selected by the Curator from the extensive collection of the late C. F. Parker, and render further additions to this branch needless. The founder of this collection was for many years the Curator in charge of the Academy of Natural Sciences of Philadelphia.

6. The *Robert R. Corson Collection of Stalactites, Stalagmites, and Helictites*, represents the celebrated Luray Caverns, and illustrates the limestone formations which render these caverns the second in magnificence in the world.

7. The *Eckfeldt Herbarium* consists of over two thousand plants, illustrating the flora of Pennsylvania.

In addition to the above, there is a large and constantly increasing collection of stuffed and alcoholic specimens of vertebrates and invertebrates (including the U. S. Fish Commission Educational Collection), of dissected specimens for demonstration in the lectures on Physiology and Hygiene, glass and papier-maché models of invertebrates and of special points in vegetable and animal morphology, besides some three hundred classified diagrams and finely colored charts illustrating every branch of natural history.

## The Gymnasium.

*The Gymnasium* is supplied with a full set of apparatus for exercising according to the system of Dr. Sargent. The exercises are conducted in separate classes for the young men and young women, and are required of all.

*Students are requested to bring from home a physician's certificate, if there is any cause that would make it dangerous for them to take part in the exercises required.*

A large room in the main building also is set apart for the exercises of the young women.

The extensive and beautiful grounds connected with the College invite to out-door exercise, which is encouraged by the authorities. On the highest and driest part of the campus, a space has been prepared for athletic games, with a quarter-mile cinder running-track, a well-graded field for foot-ball and base-ball, whilst the surrounding country offers facilities for cross-country running.

## General Regulations.

*Religious Exercises.*—While care is taken to inculcate the doctrine that religion is a matter of practical daily life, and is not confined to the observance of set forms or the promulgation of religious tenets, the regular assembling for religious purposes is carefully observed. On First-day morning, a religious meeting is held, attended by students, teachers, and members of the household, and occasionally by visiting Friends. The meeting is preceded by First-day school exercises, consisting of the recitation of passages of Scripture prepared by members of the different classes, and the reading of a portion of Scripture. The daily exercises are opened by a general meeting for reading selected portions of Scripture or other suitable books, and for imparting such moral lessons as circumstances seem to require, followed by a period of silence before entering upon the duties of the day.

*Leave of Absence* will not be granted without a *written* request from parents or guardians, which request should give reasons that may be satisfactory to the Faculty.



Students may be visited on week-days, by parents or guardians or near relatives, or by others approved by parents or guardians; but general visiting is discouraged. *Students must not be interrupted in their studies or recitations at any time, nor must they be visited on First-day.*

All persons who are interested in education, and who are desirous of examining the methods of instruction and discipline at Swarthmore, will be welcomed at any time, and should, when convenient, communicate with the President upon the subject in advance.

*The use of Tobacco being strictly prohibited, those addicted to its use, unless prepared to renounce it entirely, should not apply for admission.*

*Commencement and Vacations.*—The College year begins on the second Third-day of Ninth month, and closes with Commencement-day, which occurs on the third Third-day of Sixth month.

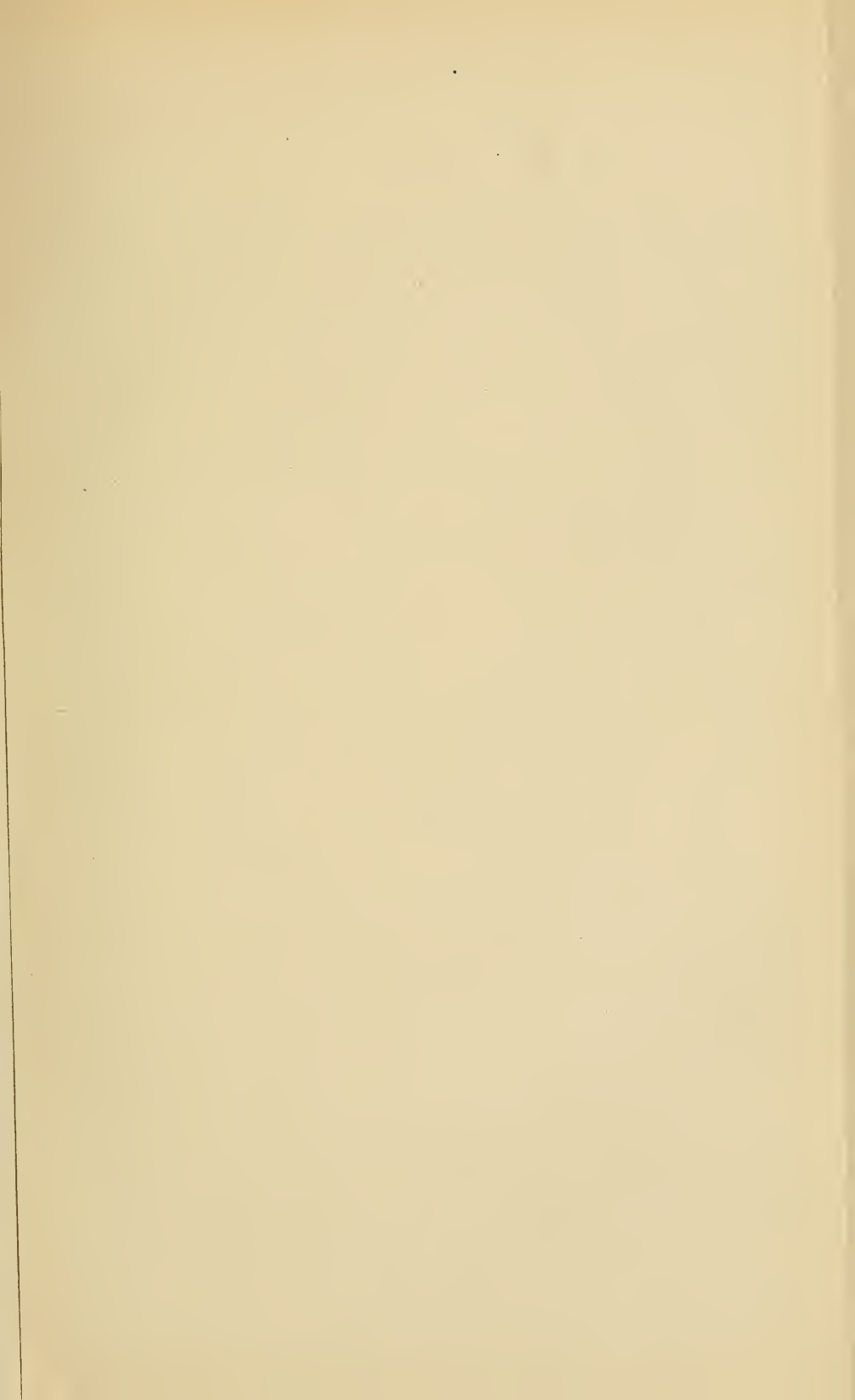
Students are not admitted for a period less than the current College year; but, when vacancies exist, they may enter at any time during the year.

Besides the summer vacation, there will be a recess of about ten days at the close of the Twelfth month, and one week in the Fourth month. (See Calendar.)

Students are permitted to remain at the College, under care, during the recesses, but not during the summer vacation.

*The Household.*—In the organization of this institution, unusual care has been extended to the personal comfort and the social interests of the students. This department is in charge of the Dean, with able assistants. She has also special oversight of the conduct and health of the young women and girls, and parents are desired to communicate freely with her in regard to the welfare of their daughters.





Map  
of  
**SWARTHMORE COLLEGE**  
CAMPUS and FARM

22500 ACRES.



- Key: Main College Building  
 1. Scientific Building or Museum Laboratory  
 2. Main Hall  
 3. Observatory on Flag's House  
 4. Chapel  
 5. Post Office  
 6. Gymnasium  
 7. Business Library  
 8. Artistic Building  
 9. Lake House  
 10. Farm  
 11. College Farm  
 12. Dormitory and student Farm  
 13. Vegetables

## Expenses.

The cost of Board and Tuition is \$450 per year, of which \$250 is payable in advance, and \$200 on the first of First month.

A deduction of \$100 per year from the above charge is made to all students who are children of members of the religious Society of Friends.

*For Day Students*, the price is \$200 per year, of which \$100 is payable in advance, and the remainder on the first of First month. A deduction of \$50 per year from this charge is made to all students who are children of members of the religious Society of Friends. The day students dine with the resident students.

*Books are furnished* for the use of all students without expense; but they buy their own stationery, drawing implements, and certain tools and materials used in the workshops. Students taking laboratory courses make a deposit of \$10 at the beginning of the course, to cover the expense of the material used. The unexpended balance is returned at the end of the course.

*In case of illness*, no extra charge is made unless a physician be employed.

The above figures may be depended upon as covering all necessary expenses, as *there are no extra charges*.

## Payments.

Payments are to be made by check or draft to the order of

ROBERT BIDDLE, Treasurer,  
No. 507 COMMERCE STREET, PHILADELPHIA.

## Needs of the College.

As a rule, all institutions, ceasing to have needs, cease to grow and improve. Attention is called to the following:

1. Library Hall, and funds for books.
2. Additional accommodations for scientific instruction.
3. Somerville Hall, including Gymnasium for girls.
4. Art Studio and equipment, including photographs or copies of Old Masters and standard works.
5. Scholarships, especially to train Friends for professorships.
6. Increased dormitory accommodations.
7. A building with increased facilities for the department of Engineering and Mechanic Arts.

## Introductory.

The studies required for a Degree extend over four years. The requirements for admission are intended to be such as Friends' schools generally can meet. Owing to the enforcement of regular hours for study, and the absence of all opportunity for dissipation, the amount accomplished in four years is large, and is believed to afford a sufficient preparation in classics, science, and general culture for the ordinary avocations of life, for the study of any of the learned professions, or for the pursuit of special courses in the higher universities.

### Time and Conditions of Admission.

To secure places, application for admission should be made as early as possible by letter to the President.

All applicants must submit satisfactory testimonials of good character from their last teachers, and students coming from another college must present certificates of honorable dismissal.

The examinations for admission may be taken either in the Summer at the close of the College year, or in the Fall. The times are as follows for the year 1891.

### Summer Examinations.

Sixth-day, Sixth Month 12th, at	8.15	A.M.	Mathematics.
" " " "	10.30	A.M.	English.
" " " "	11.30	A.M.	Geography.
" " " "	2.00	P.M.	History.
" " " "	3.00	P.M.	Latin.
" " " "	4.00	P.M.	Greek.
Seventh-day, " " 13th, at	8.15	A.M.	Physical Geography.
" " " "	9.15	A.M.	German.
" " " "	10.15	A.M.	French.
" " " "	11.15	A.M.	Draughting.

### Fall Examinations.

Candidates should present themselves at the College on the afternoon of Third-day, Ninth Month 8th, 1891.

The Examinations will occur as follows:

Fourth-day, Ninth Month 9th,	8.15	A.M.	Mathematics.
“ “ “ “	10.30	A.M.	English.
“ “ “ “	11.30	A.M.	Geography.
“ “ “ “	2	P.M.	History.
“ “ “ “	3	P.M.	Latin.
“ “ “ “	4	P.M.	Greek.
Fifth day, Ninth Month 10th,	8.15	A.M.	Physical Geography.
“ “ “ “	9 15	A.M.	German.
“ “ “ “	10.15	A.M.	French.
“ “ “ “	11.15	A.M.	Draughting.

Students are also admitted at any time during the year, and are charged for the unexpired time until the close of the year.

## Requirements for Admission.

Candidates for admission to the Freshman Class will be examined in the following subjects :

1. MATHEMATICS.—*Arithmetic*.—Entire.

*Algebra*.—Through Equations of the second degree of one unknown quantity.

*Geometry*.—The whole of Plane Geometry.

2. ENGLISH.—The candidate will be asked to write a few pages upon some assigned subject, or from dictation. This exercise will be examined with reference to Grammar, Spelling, Paragraphing, Punctuation, and the use of Capitals. An examination will also be given in the principles of the grammar.

3. HISTORY.—A thorough preparation in the outlines of the history of the United States and of England. The amount required in each subject being equivalent to what is contained in the following text-books: Scudder's or Eggleston's School History of the United States, and Gardiner's School History of England, or Edith Thompson's History of England (Freeman's Historical Series).

4. GEOGRAPHY.—The general facts of Physical Geography, Descriptive and Political Geography, especially of the United States and Europe

In addition to the above, candidates for the *Classical Course* must be examined in

LATIN.—Cæsar, Gallic War, four books; Virgil's *Æneid*, six books; Allen's Latin Composition, Part I.

Greek is not required for admission, but a course of three years is required in College for the Degree of A.B. See page 38.

Candidates for any of the other Courses must be examined in either Latin, as above, or in one of the following languages :

FRENCH.—The candidate should be familiar with the Grammar, especially with the formation and use of verbs. He should be able to read easy French at sight, and to translate simple English sentences into French.

GERMAN.—The preparation in German should occupy at least one year. The candidate should be able to read easy German at sight, and to translate simple English sentences into correct German.

Candidates for the Courses in Science or Engineering must pass in

DRAUGHTING.—Elements, Plane Problems in Geometry, Projections of points, lines, and solids.

Students applying for admission into the Freshman Class who may be found unable to meet all requirements, will be afforded an opportunity of completing their preparation by entering the recently established Sub-Collegiate Class. This privilege will, however, be accorded to those only who shall be able to complete such preparation in a period not longer than one year.

*Admission Without Examination.*—Graduates of the following Schools are admitted to the Freshman Class without examination upon presenting regular certificates properly filled up by the Principals of the Schools named.\*

Friends' Central School . . . . .	Philadelphia, Pa.
Friends' Seminary . . . . .	New York, N. Y.
Friends' High School . . . . .	Baltimore, Md.
Woodstown Academy . . . . .	Woodstown, N. J.
Friends' School . . . . .	Wilmington, Del.
Friends' High School . . . . .	West Chester, Pa.
Friends' High School . . . . .	Moorestown, N. J.
Buckingham Friends' School . . . . .	Lahaska, Pa.
Friends' Academy . . . . .	Locust Valley, L. I.
Friends' Select School . . . . .	Washington, D. C.
Sherwood School . . . . .	Sandy Spring, Md.
Friends' School . . . . .	Kennett Square, Pa.
Providence Preparative Meeting School . . . . .	Media, Pa.

Blank certificates will be furnished each year to the Principals of these preparatory Schools and to such private teachers as may be named for the privilege. The Faculty reserves the right, however, to withdraw from such School or teacher the privilege of sending pupils into College on certificates.

Pupils from these Schools, intending to enter the College, should apply by letter for places as soon as convenient after the completion of their preparation. They should present themselves at the College on Fifth-day, Ninth month 10th, 1891.

\* Other Friends' Schools may on application be added to the above list, if the Faculty and Instruction Committee shall be satisfied that they are taught by competent teachers and are furnishing the requisite preparation for admission.



Principals of other Schools, who wish to have students admitted on their recommendation, should correspond with the President concerning each case.

*Examinations for Higher Classes.*—Candidates for classes higher than the Freshman Class must pass satisfactorily in all the subjects pursued by the lower class or classes; and students coming from other Colleges must present letters of honorable dismissal and must show that they have pursued courses of study equivalent to those taken by the classes they wish to enter.

*The Sub-Collegiate Class.*—In consequence of the action of the Board of Managers at a meeting held Twelfth month 2d, 1889, the Preparatory School was formally abolished, its existence terminating at the close of the academic year, 1889-90. Instead of the Preparatory School, a class to be known as the Sub-Collegiate Class was established to afford students who are not at the time of application sufficiently advanced to enter the Freshman Class, an opportunity for making up their deficiencies, provided that this can be accomplished in a period not greater than one year.

Candidates for admission to the Sub-Collegiate Class will be examined in the following subjects.

1. MATHEMATICS.—*Arithmetic.*—Fundamental Rules, Fractions (Common and Decimal), Denominate Numbers, Percentage and its applications, Proportion and the Metric System.

ALGEBRA.—To Quadratic Equations

GEOMETRY.—Books I, II, III.

2. ENGLISH.—Composition; Grammar.

3. HISTORY.—A thorough preparation in the outlines of the history of the United States and of England. The amount required in each subject being equivalent to what is contained in the following text-books: Scudder's or Eggleston's School History of the United States, and Gardiner's School History of England, or Edith Thompson's History of England (Freeman's Historical Series).

GEOGRAPHY.—The general facts of Physical Geography, Descriptive and Political Geography, especially of the United States and Europe.

LATIN.—(Required of students in Arts). Cæsar, Gallic War. two books; Virgil's *Æneid*, one book; Grammar, Paradigms.

*Partial Courses of Study.*—A limited number of teachers and other persons of fair education and over twenty-one years of age, who may wish to improve themselves in particular studies, will be received without examination, and allowed to elect, in any of the regular classes, such work as they can pursue to advantage. They should in all cases correspond with the President in advance.

# Courses of Instruction.

ALPHABETICALLY ARRANGED.

For required and elective studies, and the number of exercises per week in each, see page 52.

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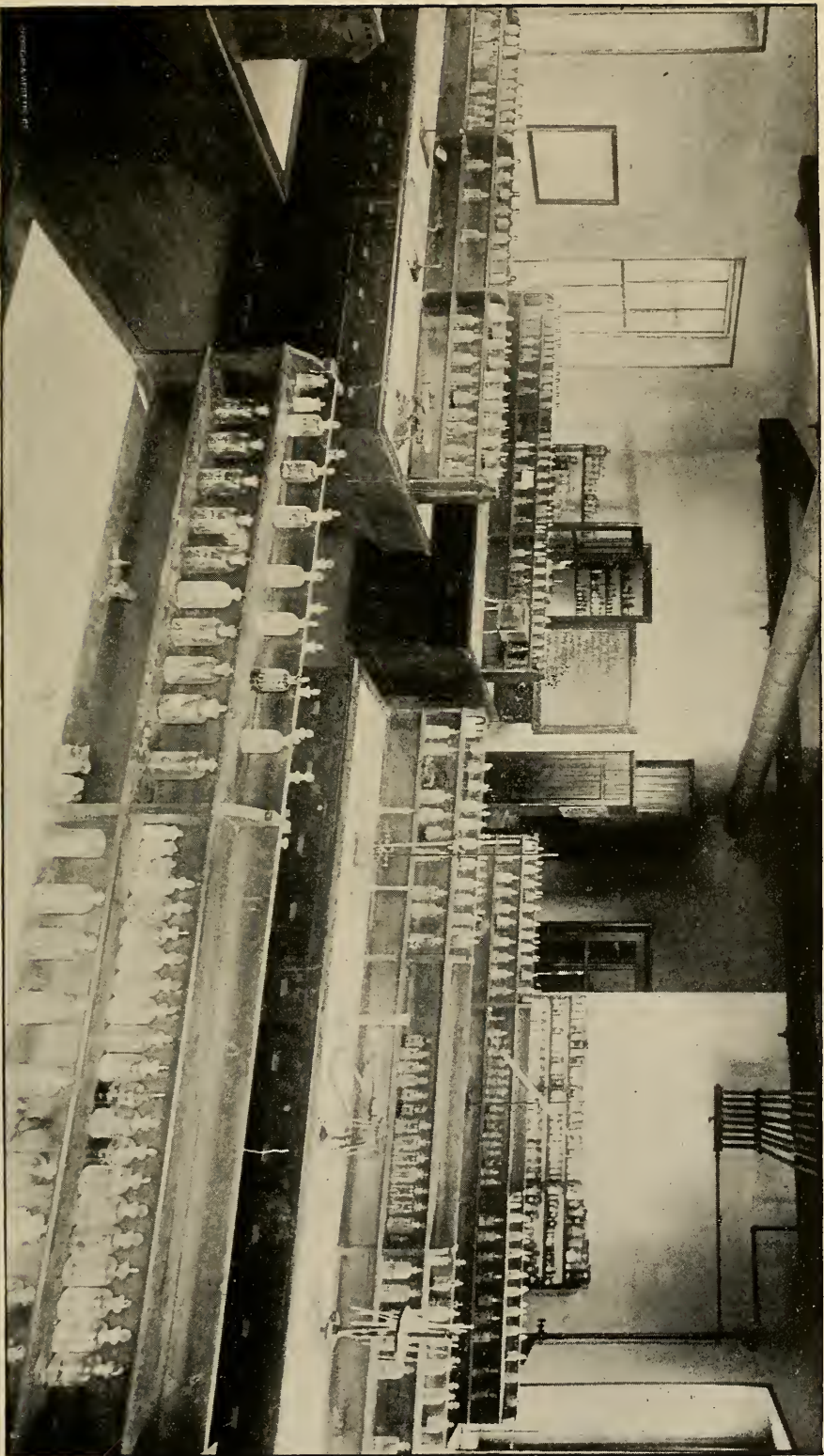
## Chemistry.

The course of instruction in this subject extends over a period of four years, and aims to impart a thorough understanding of the most essential facts and principles of the science, while special attention is given to the cultivation of systematic habits of manipulation, so that, besides possessing value as part of a liberal education, it forms a foundation for such pursuits in life as require this knowledge.

Those who may desire to continue their work beyond the limits of the regular course will have suitable work assigned them, and will find every facility for carrying it on.

*The Chemical Laboratory* occupies rooms in Science Hall. It includes a room for work in general Chemistry and Qualitative Analysis, one for Quantitative Analysis, and a basement room for Assaying and Metallurgy. Near to these are store-rooms, a balance-room, and a lecture-room. The Laboratory tables are covered with glazed tiles; fume-closets, suction for filtration, water and gas are provided. The lecture-room, with a seating capacity of one-hundred, is furnished with water, gas, fume-closets, and abundant apparatus for lecture purposes. For lecture illustration, there is an excellent collection of the metals and their salts, and a cabinet of minerals (deposited by Hugh Foulke); in addition to these, there is a complete set of typical preparations for use in the course in Organic Chemistry.

*Chemical Library.*—In all cases students are encouraged in the habit of consulting for themselves the best authorities; and in a room near to the Laboratory there will be found a number of standard works on Chemistry; among them may be mentioned Watt's "Dictionary of Chemistry," Roscoe and Schorlemmer's "Treatise on Chemistry," besides numerous other works on technical and analytical chemistry, and current chemical journals.



CHEMICAL LABORATORY



*Text-Books.*—As the student advances in the course the following text-books are supplied: "Elementary Chemistry," Remsen; "Introduction to Qualitative Analysis," Beilstein; "Introduction to the Study of the Compounds of Carbon," Remsen; "Quantitative Chemical Analysis," Fresenius; "Theoretical Chemistry," Remsen.

## FRESHMAN CLASS.

*a. Lectures (Experimental).*—General Elementary Chemistry (non-metals and metals), with examinations.

*b. Laboratory-Work.*—Special exercises on topics previously discussed in the lectures.

## SOPHOMORE CLASS.

*a. Lectures.*—Theoretical Chemistry, followed by Qualitative Analysis.

*b. Laboratory-Work.*—Qualitative followed by Quantitative Chemical Analysis.

## JUNIOR CLASS.

*a. Lectures.*—Chemistry of the compounds of carbon.

*b. Laboratory-Work.*—Quantitative Analysis, followed by a number of exercises in important, typical, organic transformations.

## SENIOR CLASS.

The course during this year consists largely of laboratory work. A few special subjects are given to each student, with the understanding that he is to fulfil the practical and theoretical requirements of these subjects in a complete, exhaustive, and scholarly manner. Such work will involve the study of technical works and a number of the current chemical journals. Meetings will occasionally be held for the consideration of important researches, as they appear from time to time in the journals.

## Drawing and Painting.

A course of Freehand Drawing and Painting is open to all. Aside from its intrinsic value as a means of culture, it leads to habits of close observation, and is a very important adjunct to the other courses—especially to those of Engineering and Science.



It consists of drawing from objects and casts, and painting from still-life, flowers, etc., and a series of lectures on Practical Perspective and the History of Painting. A Sketch Class is open to the students qualified to work in it. It is held one afternoon a week for outdoor sketching in the Spring and Autumn, and during the Winter-time sketches are made in the studio from casts and still-life, in color and light and shade.

The drawings required from each student before admission to the work of the advanced class are as follows:

FRESHMAN CLASS.

Pencil Outline: Cast, details of ornament; plant or flower.  
Light and Shade: Models, group; objects; cast, ornament.  
Color: Landscape, copy; or flower, copy.

SOPHOMORE CLASS.

Light and Shade: Cast, ornament; objects, still-life.  
Color: Landscape, copy; flower, copy; objects.

JUNIOR CLASS.

Light and Shade: Cast, details of figure; group, still-life.  
Color: Objects, still-life.

SENIOR CLASS.

Light and Shade: Cast, head or figure; head, sketch from life.  
Color: Landscape, nature; flower or fruit, nature.

## Engineering and Mechanic Arts.

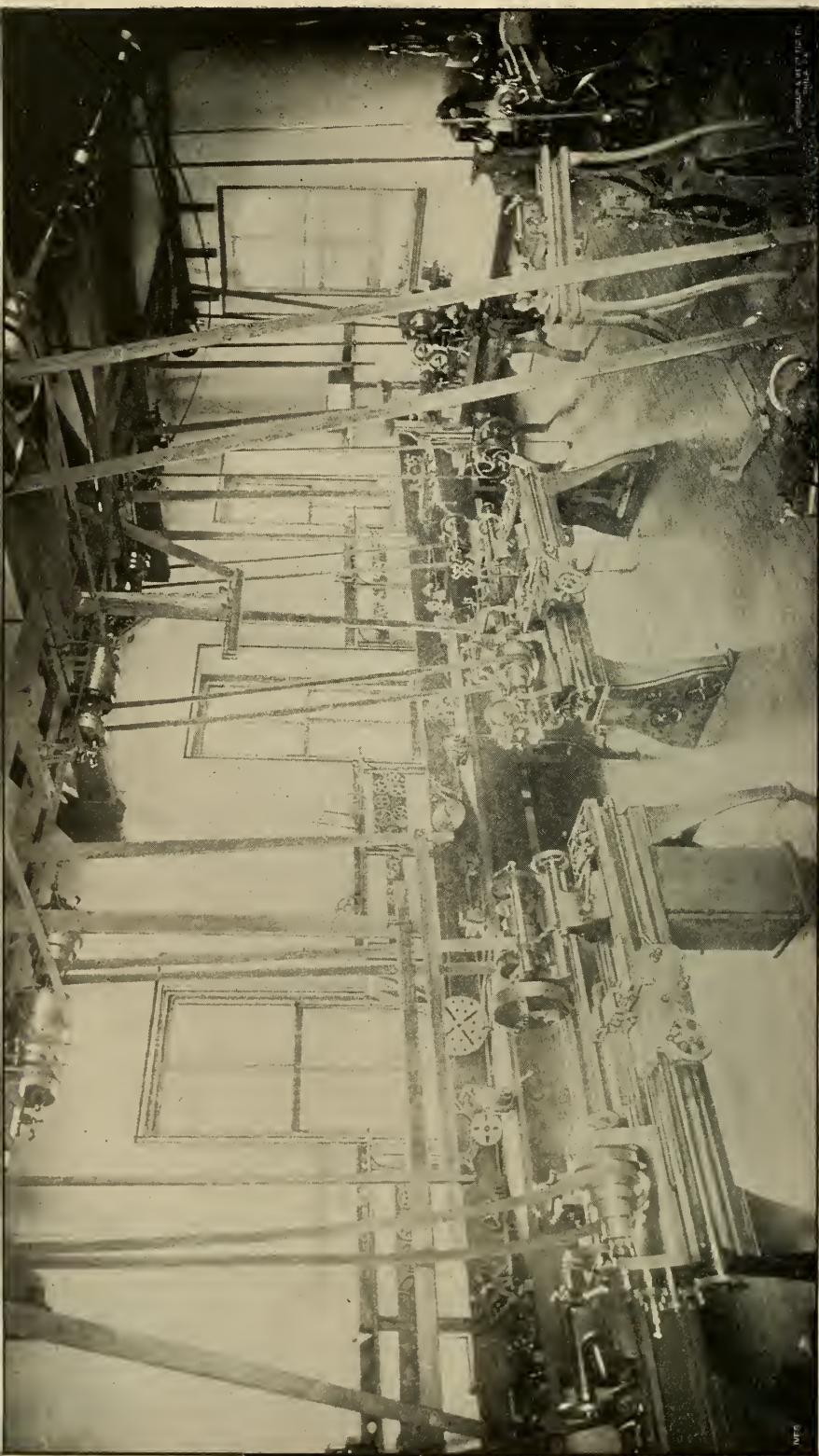
This department is intended to give a good preparation to those students who are expecting to become either Civil or Mechanical Engineers, or to engage in any of the specialties of engineering practice.

The studies and exercises are so arranged that the graduates will be prepared to become immediately useful in the office, works, or field, in subordinate positions, and, after a fair amount of such practice, to design and take charge of important works.

The location of the College is most favorable for residence and study, combining the quiet of the country with ready access to Phila-







MACHINE SHOP

delphia and the many important manufacturing cities in its vicinity, and permitting frequent visits to industrial and engineering works of every kind.

The department is well provided with the necessary field instruments, transits, levels, plane-table, etc., and each student is made familiar with their use and management by practical exercises in the field and draughting-room, carefully planned to illustrate the actual practice of the engineer. Included in the work of this department is a course in the Mechanic Arts, in which regular and systematic instruction is given in thoroughly equipped workshops, and by skilled instructors in the use of tools and machinery, and in methods and processes.

*The Draughting-Rooms* are lighted from the north, are furnished with adjustable tables, models, etc., are well ventilated and warmed, and are open for work during the greater part of the day.

*The Engineering Laboratory* contains an Olsen's testing-machine, arranged for tensile, compressive, and transverse tests, a steam-engine indicator, apparatus for hydraulic experiments, and other valuable instruments and appliances. It includes several shops, in which the students become familiar with the nature and properties of the materials of construction (iron, wood, brass, etc.) employed by the engineer, and with the processes of working them into the desired forms for their intended uses.

*The Machine Shop* contains an excellent and complete assortment of tools, including 4 screw-cutting engine lathes, 3 speed-lathes (simple and back-gear), an iron planer, a complete universal milling machine, a set of milling cutters adapted for general purposes and for making other cutters, a shaper, a twist-drill grinder, 2 upright drills, an emery grinder, a mill grinder, a grindstone, 14 vises (plain and swivel), 14 lathe chucks (combination, independent, scroll, and drill), a milling machine chuck, a rotary planer chuck, planer centres, a set of Betts's standard gauges, surface plates (Brown & Sharpe), sets of twist drills, reamers, mandrels, screw-plates, taps and dies, lathe centre grinder, a complete set of steam-fitters' tools with pipe vise, ratchet drill, etc., together with the many necessary small tools, hammers, chisels, files, etc. Additions are constantly being made to this collection, as they are needed, either by manufacture in the shops or by

purchase. Power is furnished by a steam engine and boiler, the former fitted with an improved indicator, and the latter with the necessary attachments for determining its efficiency, etc.

*The Wood-Working Shop* contains 20 benches with vises, and 20 sets of wood-working tools, a grindstone, and wood-turning lathes.

*The Smith-Shop* contains 7 forges, 10 anvils, and sets of blacksmith tools, bench, and vise.

*The Foundry* contains a brass-furnace, moulders' benches, a variety of patterns, and full sets of moulders' tools.

The details of the course vary somewhat from year to year; but, in general, are represented by the following arrangement of the studies:

#### FRESHMAN CLASS.

*Machine Shop Practice*: vise work, chipping and filing to line, scraping, fitting, tapping, reaming, hand-turning in brass and iron.

*Drawing*: Special geometric problems, working drawings for the shop exercises, orthographic projections, shadows, brush work and tinting, machine drawing from copy and from measurements, gears, eccentrics, cams, pulleys, belting, etc.

*Engineering*: Lectures on the use of tools, on the properties of materials, etc.

#### SOPHOMORE CLASS.

*Engineering*: Analytical mechanics of solids and fluids: descriptive geometry, including shades, shadows, and perspective; and the careful construction of the more important problems; land surveying, with field practice and map drawing.

*Machine-Shop Practice*.—Lathe work, turning, boring, screw-cutting, drilling, planing, milling, grinding, polishing, etc., construction of a project. Lectures on machine tools, on materials of construction, etc.

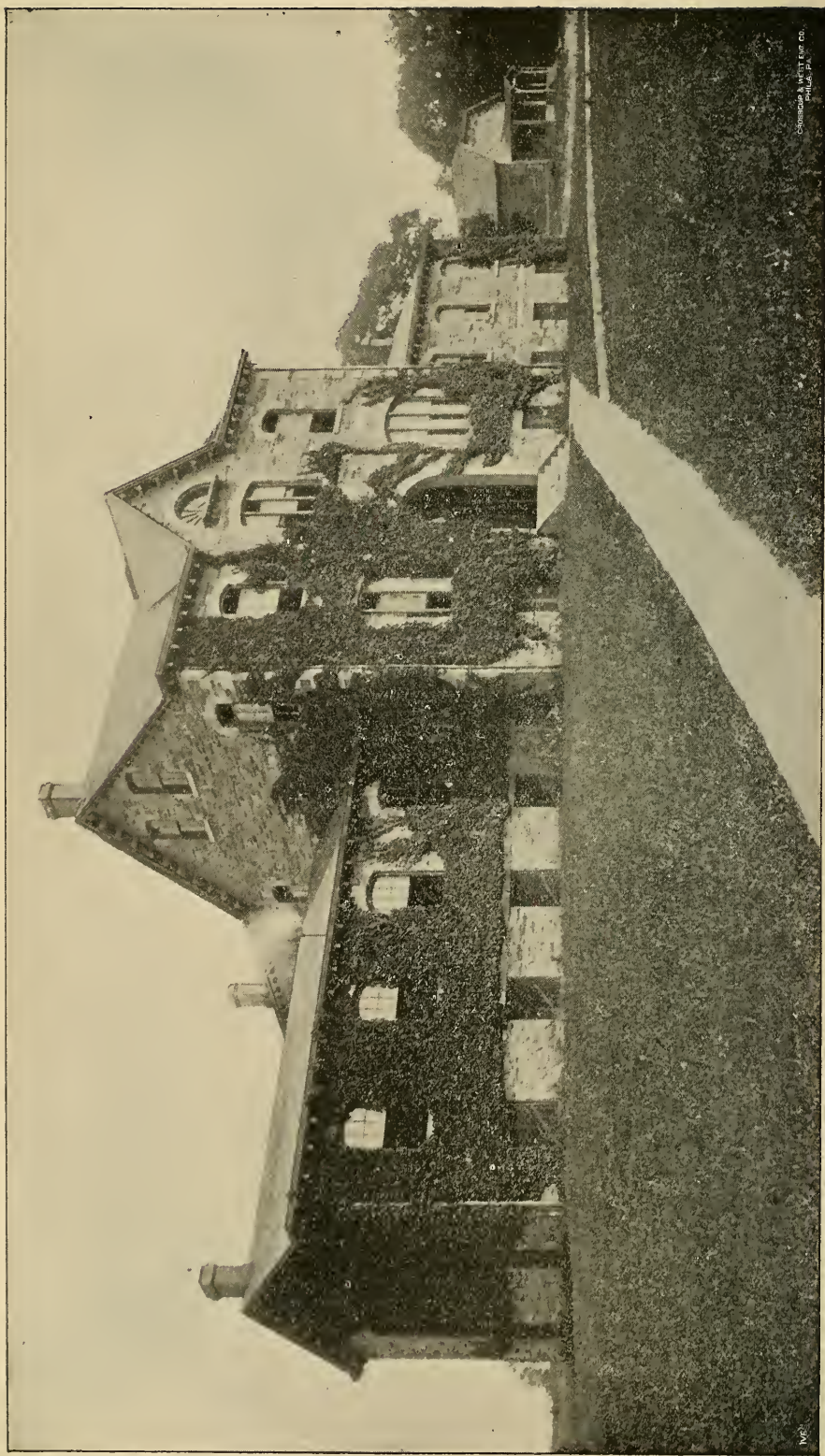
*Drawing*.—Working drawings for the shop exercises, sketches, drawings and blue prints for special work and projects, elements of machines, shadows and intersections, finished drawings.

#### JUNIOR CLASS.

*Engineering*: Theory and practice of road surveying and engineering.







SCIENCE HALL—MEETING HOUSE



*Geodesy*.—Theory, adjustment and use of engineering field instruments; farm surveying; leveling; topographical, triangular, and hydrographical surveying.

*Applied Mechanics*.—Friction and other resistances; stress and strength of materials.

*Drawing and Mechanism*.—Topographical, structure, and machine drawing; principles of mechanism; visits to and sketches of special machinery and structures.

*Practical Exercises* in the field in the Fall and Spring months, and in general laboratory practice, including the testing of metals and building materials, the setting up, testing, and management of steam-engines, boilers, and machinery, throughout the year; with occasional visits to mechanical establishments, and to important engineering works in or near Philadelphia.

#### SENIOR CLASS.

*Engineering*: Theory and practice of road surveying and engineering, continued; building materials; stability of structures; foundations and superstructures; bridge construction.

*Applied Mechanics*.—Practical hydraulics; practical pneumatics; general theory of machines; theory of prime movers, steam-engines, turbines, etc.; measurement of power.

*Mechanism*.—Principles of mechanism, of machine design, of the transmission of power; construction and use of tools.

*Drawing*.—Stone-cutting problems; topographical, structure, and machine drawing; plans, profiles, and sections of road surveys; working drawings.

*Practical Exercises*.—As in Junior year, continued; tests of building materials; graduating thesis.

The Degree conferred at the completion of the course is Bachelor of Science in Engineering.

## English Language and Literature.

The course in English Literature extends through four years, instruction being given by recitations and lectures. During this time the English Language is studied in connection with the Literature from the Anglo-Saxon period down to the present day. The particular

feature of the course is the critical reading in the class-room of representative authors, such as Chaucer, Shakespeare, Milton, Pope, Tennyson. Peculiarities of style and language are considered, allusions are looked up, and every effort made for a thorough comprehension of the work in hand. The author's life is studied in its relation to the history of the time, and his works are compared with those of his contemporaries. By this course it is expected that the student will be enabled, from his own observation, to form an intelligent estimate of the style and merits of the great authors of English Literature.

The courses offered are as follows:

FRESHMAN CLASS.

The nineteenth century. Poetry and Prose.

SOPHOMORE CLASS.

The period from about 1750, continuing into the nineteenth century.

SENIOR AND JUNIOR CLASSES.

The period from Milton to Dr. Johnson.

SENIOR AND JUNIOR CLASSES.

From the Anglo-Saxon period to Milton. Readings in Anglo-Saxon, Chaucer, Spenser, Shakespeare, etc.

The last two Courses are given in alternate years.

## French.

SUB-COLLEGIATE CLASS.

Chardenal's First French Course, Super's Preparatory French Reader, selected Contes, Aubert's Colloquial French Drill, writing and speaking French.

FRESHMAN CLASS.

First Semester: French Grammar, Fénelon's *Télémaque*, varied selections from modern French writers, *Dictées*, Conversation.

SOPHOMORE CLASS.

Second Semester: Magill's Prose and Poetry, varied selections from modern French writers, French Grammar, *Dictées*, Conversations, Introductory Lessons to French Literature (Lectures).

## JUNIOR CLASS.

Second Semester: Bôcher's College Series of Plays, varied selections from modern French writers, French Grammar, Dictées, Conversations, French Literature (Lectures).

## SENIOR CLASS.

First Semester: Corneille's Cid and Polyeucte, Racine's Athalie and Iphigénie, Molière's Misanthrope, Les Précieuses Ridicules, etc., varied selections from modern French writers, French Grammar, Dictées, Conversations, French Literature (Lectures), Petit de Julléville's Leçons de Littérature Française de Corneille à nos jours.

## German.

## SUB-COLLEGIATE CLASS.

Beginning German: The Grammar, with constant practice in writing exercises; reading German ballads and easy prose, conversational exercises, and memorizing easy selections.

## FRESHMAN CLASS.

Second Semester: Stories and easy plays—Eigensinn, Einer muss heirathen, etc.; selections from recent fiction, writing exercises, conversation, dictation, and memorizing easy selections.

## SOPHOMORE CLASS.

First Semester: Aus dem Leben eines Taugenichts, Wilhelm Tell, etc., exercises in writing German, conversation, sight-reading, and memorizing selections.

## JUNIOR CLASS.

First Semester: Schiller's Maria Stuart, Jungfrau von Orleans, etc., dictation, writing, conversation, sight-reading, and memorizing selections.

## SENIOR CLASS.

Second Semester: Goethe, Lessing, Schiller's Prose, studies in the History of German Literature, conversation and writing, sight-reading, and memorizing classic poetry and prose selections.

Evening Readings, open to all students.

An optional course in Scientific German will be offered for Seniors and others intending subsequently to pursue a course in Medicine or other advanced scientific work.

## Greek.

Greek is not required for admission to the College, but a course of three years is required for graduation with the Degree of A.B., as per scheme below. Those who offer Greek on entering the College will go on in advanced classes. Those who have not previously studied the language will be required to complete the following courses:

### SOPHOMORE CLASS.

Goodwin's Grammar, Xenophon's Anabasis, Greek Testament.

### JUNIOR CLASS.

Plato's Apology and Crito, Xenophon's Memorabilia, Greek Composition.

### SENIOR CLASS.

Homer's Iliad or Odyssey (six books), Euripides' Iphigenia in Tauris, History of Greek Literature (Lectures), Modern Greek (Readings in Vincent and Dickson's Hand-book, with colloquial practice).

## History.

The instruction in History consists of lectures, recitations, oral and written reports by the students on various assigned topics that require the use of several standard authorities, map-drawing, and the preparation of diagrams to illustrate statistics. To encourage the study of History by means of biography, the preparation of biographical sketches of leading historical characters is required. All who intend to pursue the courses in History should be thoroughly familiar with the outlines of the history of the United States and England, before entering the Freshman Class.

The courses offered are as follows:

### FRESHMAN CLASS.

Ancient History, embracing an outline of the civilizations of Egypt, Chaldæa, Assyria, Babylonia, the Hebrew nation, Phœnicia, Persia, and Lydia, and a detailed study of the history of Greece and Rome, with comparisons between their political, social, and religious institutions, and biographical sketches of many prominent characters. This course is designed as a basis for all future historical study in the

later courses, and it aims to give students a true conception of the value and significance of History. Four hours a week throughout the year.

SOPHOMORE CLASS.

First Semester: The history of France, principally from the reign of Henry the Fourth, with a brief sketch of the preceding period from the establishment of the Frankish monarchy. Two hours a week. Second Semester: Mediæval and Modern History, including such topics as the Character and Institutions of Primitive Christianity, Teutonic Migrations, Church and State in the Middle Ages, the Renaissance, the Reformation and Thirty Years' War, the social history of the people, the rise of Prussia, and the general political history of Europe during this century. Four hours a week.

JUNIOR CLASS.

First Semester: The social and political history of England, including a study of its present form of government, and the reforms in legislation during the present century. The history of Puritanism is studied in detail, and the rise of the Society of Friends and its early organization. Four hours a week. Second Semester: An advanced course in the topical study of the history of the United States. The course includes the social and political history of the English Colonies, the government under the Articles of Confederation, the formation and adoption of the present Constitution, the organization of the National Government, the development of commerce and industry, the slavery question, etc., and a study of the Constitutions of the United States and Pennsylvania. Four hours a week.

## Latin.

FRESHMAN CLASS.

Cicero, Orations; Sallust, Catiline; Latin Composition.

SOPHOMORE CLASS.

Horace, Odes and selections from Epodes, Satires, and Epistles; Cox's Manual of Mythology.

JUNIOR CLASS.

Remnants of Early Latin; Plautus, Trinummus; Terence, Phormio; Cicero, De Senectute; Latin Hymns.

## SENIOR CLASS.

Selections from Lucretius, Catullus, Livy, Juvenal, Virgil's Georgics and Æneid (Books VII–XII); Tacitus, Agricola.

The above is a statement of the work to be done during 1890–91. The authors read, as well as other work of the department, are likely to vary somewhat from year to year.

There is a Latin Society, intended to supplement the work of the class-room. It is composed of Seniors and Juniors, and meets once in six weeks. Papers prepared by the students are read and discussed under the guidance of the professor. This year, the most of the time will be given to the study of the private antiquities of the Romans.

## Logic.

## SENIOR CLASS.

Two exercises a week during First Semester. (Jevons).

## Mathematics.

## FRESHMAN CLASS.

Wentworth's College Algebra, through Quadratic Equations; Chauvenet's Geometry (Byerly's edition), Review and Book VI; Wheeler's and Chauvenet's Plane Trigonometry.

## SOPHOMORE CLASS.

Chauvenet's Geometry (Byerly's edition), finished; Wentworth's College Algebra, finished; Todhunter's Conic Sections, Young's General Astronomy.

## JUNIOR CLASS.

Williamson's Differential and Integral Calculus, Chauvenet's Spherical Trigonometry, Determinants.

## SENIOR CLASS.

Chauvenet's Spherical and Practical Astronomy.

## Natural History.

Under this head are included the studies of Zoology, Botany, Physiology, Geology, and Mineralogy.



The subjects are so arranged, throughout the four College years, that they form a graded course, admirably adapted to the purpose of training young men and young women in the right methods of thinking about and interpreting the problems continually presented to them by natural objects. While lectures and text-books are used to inspire the members of the class to study, these means are supplemented, in so far as possible, by drill in the Laboratory and field ; by which the students become accustomed to see for themselves, to gather facts, to study and arrange them, and to deduce the principles involved. The course is arranged as follows :

#### ZOOLOGY AND BOTANY.

The course in Zoology consists of two lectures a week to the Sophomore and Freshman Classes, on the various groups of animals, their classification, anatomy, development, distribution, habits, and economic relations ; it extends over two years. The lectures are illustrated by means of a large collection of colored charts and diagrams, and by specimens from the very complete set of skeletons, stuffed and preserved animals, shells and fossils.

Lectures and recitations in Elementary Botany are given during a portion of the Freshman and Sophomore years. It is intended in this course only to teach the more prominent points in vegetal morphology, to accustom the student to accurate observation, and to the use of the analytical key for the determination of plants.

#### PHYSIOLOGY AND HYGIENE.

A course upon these subjects is prescribed for the young men of the Freshman Class, and a separate but similar course for the young women in that class. The time is taken from the Freshman course in Zoology. *Attendance required of all students in the class.*

#### GENERAL BIOLOGY.

The practical work of the Junior Class in the Laboratory is as follows: Manipulation of microscope ; the biology of some particular plants ; the biology of some particular animals. That of the Senior Class is practical systematic work in the Museum, studies in comparative Osteology, and the dissection of types of backboned animals. Students will find in the Library a large number of valuable and interesting works pertaining more or less directly to Biology.

## GEOLOGY.

Twice a week, throughout the Second Semester, informal discussions of geological problems, and how to treat them, accompany the practical study of hand-specimens in the Laboratory. This is followed by tramps through neighboring quarries, railroad-cuts, etc., hammer in hand, under the personal supervision of the Instructor. The course is moreover illustrated by numerous charts and diagrams and by specimens from the excellent collection of typical rocks, minerals, and fossils. Leconte's "Compend of Geology" is used, supplemented by a very complete series of geological maps, works of reference, and lantern-slides.

## MINERALOGY.

Lectures and recitations once a week in Crystallography and Descriptive Mineralogy, with two periods per week of practice in determining minerals by their physical properties and by means of the blow-pipe; the whole counting as two periods. Students in Mineralogy will have access to the Leidy Collection of Minerals.

## Pedagogics.

Instruction in this branch of education is mainly by lectures, with occasional practical illustrations in class work. During the course, special educational topics are taken up, such as the origin, growth, and needs of our public schools, school laws, the qualifications of a teacher, etc.

The attention of those designing to teach is constantly directed to the methods of work practiced by their various instructors, and they are required to inform themselves by the historical and theoretical study of education, with constant use of the best books of reference on the subject, under the direction of a professor.

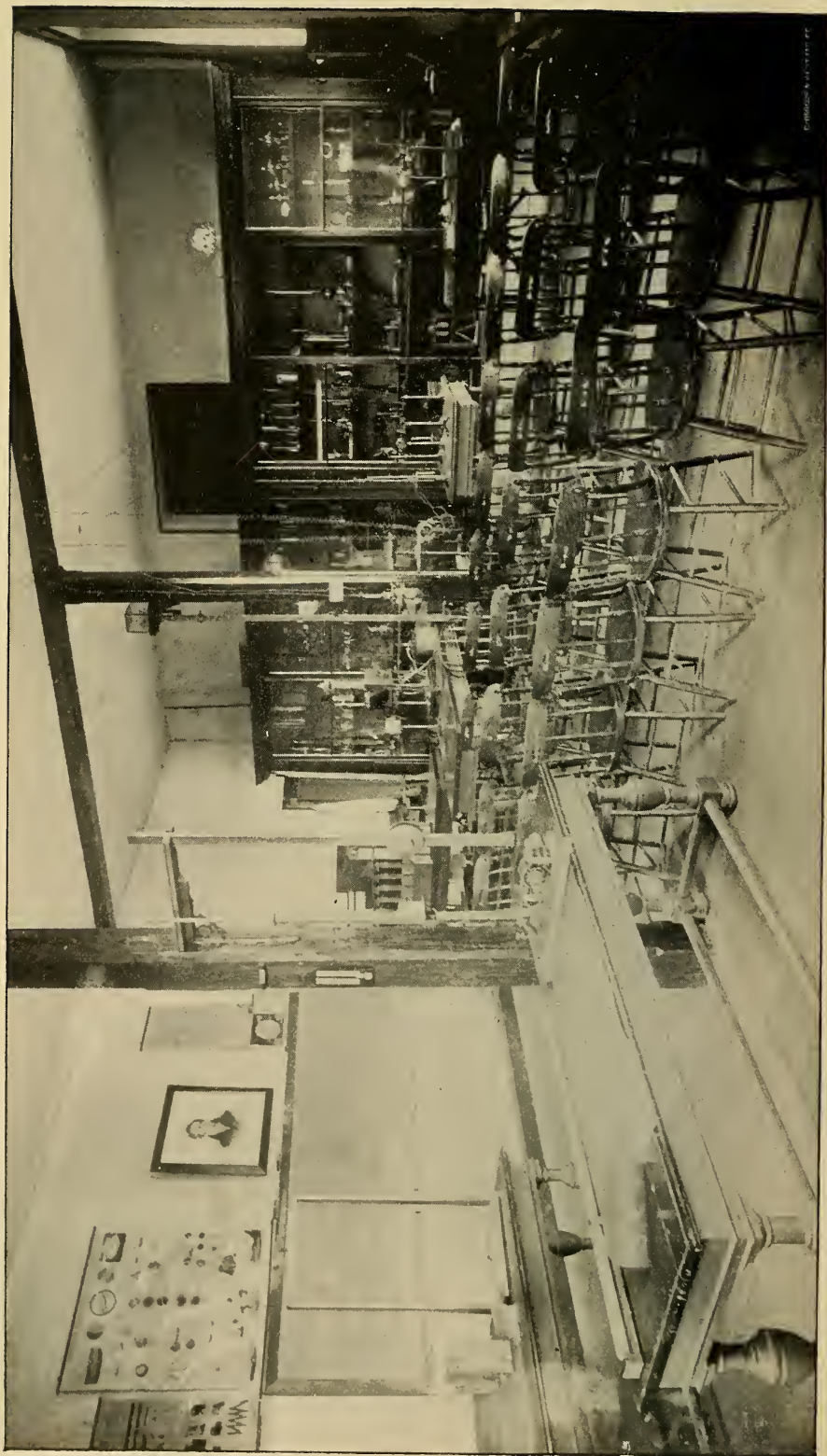
## Philosophy.

## SENIOR CLASS.

*Mental Philosophy.*—First Semester: Porter's Elements of Intellectual Science is used as a text-book, and the subject is presented historically, with outlines of the different schools of Philosophy.

*Moral Philosophy.*—Second Semester: A system of morals is





PHYSICAL LABORATORY

taught, practical rather than theoretical, setting forth man's duties, and the application thereto of the moral law. The text-book used is Janet's Elements of Morals.

Lectures, Discussions, Essays, Examinations.

## Physical Culture.

The system of Physical Culture is based on a thorough examination of each student, carefully noting all defects of development, and functional weakness, and the ratio existing between the tested strength and the muscularity; and on these data formulating a course of exercises such as will meet the requirement of each individual, so as to produce an evenly developed and healthy organism.

The young men are required to give three hours each week for carrying out the prescription of the Director.

The sports of foot-ball, base-ball, and athletics are under the direct supervision of the Director, and only those who are physically fit are allowed actively to compete; great care is taken that the games be kept within proper limits, so as not to take too much of the students' attention or energy.

The physical culture of the young women is under the most careful supervision of a student of the Sargent System. Examinations are made and prescriptions given according to the special needs of each student.

## Physics.

*The Physical Laboratory* is already provided with apparatus for determinations in the mechanics of solids and fluids, in heat, sound, light, electricity, and magnetism; as also with a large amount for lecture experiments. Most of this has been selected with care from the best American and foreign makers, but some is of home manufacture; and the co-operation of the Engineering Department and the increasing skill of our students enable us now to make each year a larger proportion for regular use in the Laboratory. It is our aim to afford students continued opportunities for instruction in the principles of construction of ordinary and special apparatus. Power for running dynamos and for other purposes is near at hand. The instruction begins in the Sophomore year, and extends through the course as follows:



For students in Arts and Letters :

SOPHOMORE CLASS.

*General Physics.*—This course consists of the investigation of the general laws of Physics and the consideration of their practical application.

The work of the course is done by lectures and recitations, accompanied by experimental verification of the laws discussed, and extends over the entire year.

JUNIOR CLASS.

During the Junior year, the course is an elective in Heat, Magnetism, Electricity, and Light.

FOR STUDENTS IN SCIENCE AND ENGINEERING.

This course occupies two consecutive years, requiring two periods per week in the Sophomore year, and four in the Junior. It is intended to be pre-eminently a practical course, consisting largely of laboratory work, in the investigation and verification of the laws of Physics.

The recitation work will cover the topics treated in Ganot's Physics, or some other text-book of equal rank, and will be supplemented by lectures on the various branches of the subject.

The division of the work is as follows :

SOPHOMORE CLASS.

Applied Mechanics and Dynamics, and Sound.

JUNIOR CLASS.

Heat, Magnetism, Electricity, and Light.

SENIOR CLASS.

Applied Electricity.

This is an elective of eight periods per week, counting as four. In this the Junior work in Magnetism and Electricity is supplemented by the practical study of their application in the telephone, telegraph, dynamo, electric light, motor, transmission of power, etc.

Work in the manufacture and use of these various appliances, as well as in the measurement of the electrical current, is accompanied by text-book work in Ayrton's Practical Electricity and by the reading and class discussion of current electrical journals. Visits to the electrical plants of the neighboring villages and cities are made at convenient times, for the purpose of studying the machinery in actual use.



## Political Science.

### SENIOR CLASS.

*Political Economy*.—First Semester: The Elements of Political Economy during the first part of the term, with Walker's Principles of Political Economy as a text-book. The course also includes a sketch of the history of Political Economy and the consideration of various social and industrial questions. Topics are assigned requiring reading in Mill, Thompson, Roscher, List, Marshall, Laveleye, etc.

Second Semester: Elements of International Law, with especial attention to the important subjects of Peace and Arbitration.

## Reading and Speaking.

This course extends over four years. It consists of training in respiration, articulation, enunciation, and the Delsarte system of gesture as far as possible. Thought-conception is made the first step toward natural and effective expression. A careful study of the authors chosen is required, so that the course becomes to some extent one in English literature. The student studies critically, and becomes familiar with many selections of acknowledged excellence.

## Rhetoric and Composition.

### FRESHMAN CLASS.

Second Semester: Diction, Structure of Sentences and Paragraphs, Analysis of Subjects, Kinds of Prose Composition, Style, Figures of Speech, and Versification.

Themes once in four weeks in Narrative and Descriptive styles of composition.

### SOPHOMORE CLASS.

Miscellaneous Themes; translations from Latin, Greek, English Prose and Poetry. Once in four weeks.

### JUNIOR CLASS.

Lectures on Oral and Written Discourse. Themes once in five weeks, embracing Criticisms, Argumentative Disputes, and Orations.

### SENIOR CLASS.

Practice in Daily Themes; Reviews or Themes suggested by the life, characteristics, and writings of standard prose writers; Philosophical and Scientific Essays. Once in five weeks.

## General Remarks on the Courses of Study.

In arranging the courses of study, while recognizing the fact that the domain of human knowledge is so vast that he who would succeed best must confine his attention chiefly to some chosen field, we have endeavored not to lose sight of the equally important fact that those are best equipped for work in any particular department who have the most extended view of the realm of learning as a whole.

To secure in a measure both these results, minor courses in many of the subjects of the curriculum are required of all; while the more extended courses in each subject are taken only by those whose taste and inclination lie in that particular direction.

In pursuing this policy for several years, we have developed four distinct lines of study. In each of them are required those subjects which are essential to the logical and natural development of the course. The courses are as follows:

### THE COURSE IN ARTS.

The characteristic feature of this course is the study of Classical Antiquity, including the language and literature of the Greeks and Romans, with their art, philosophy, religion, and political and social history. Combined with this are courses in Modern Languages, Mathematics, and Science, with some elective subjects. While this course affords that broad culture which should be the foundation of any subsequent career, it may be made to afford special preparation for Law or Journalism by including electives in History and Political Economy, or it may be shaped in the direction of Medicine by choosing electives in Biology and Chemistry. This course leads to the degree of *Bachelor of Arts*.

### THE COURSE IN LETTERS.

This course is arranged to provide a liberal education for those who do not wish to pursue the study of the ancient languages, nor to take all the science required in the Science Course. Its leading

features are a liberal amount of English, French, and German, and of History and Political Science. It includes the amount of Mathematics usually prescribed in a college course, with a fair amount of Science, and some elective subjects, including Latin. This course leads to the degree of *Bachelor of Letters*.

#### THE COURSE IN SCIENCE.

The characteristic feature of this course is more extended instruction in Science than in the preceding courses, together with a fair amount of Mathematics and Modern Language study, including English. The instruction in Physics, Chemistry, and Biology is of a twofold character; first, systematic treatment in experimental lectures; secondly, practical work in the laboratories. Thus the student acquires a familiarity, not only with the more important facts and fundamental principles of those sciences, but also with the correct methods of work, so that his course may form a foundation for subsequent higher work in any department of science. This course leads to the degree of *Bachelor of Science*.

#### THE COURSE IN ENGINEERING.

This course offers, in its various studies and exercises, a training which is believed to be well adapted to the needs of Civil and of Mechanical Engineers, as well as of the large class who are to be concerned with the material interests of the country, with manufacturing, with industrial pursuits, or with any of the many other occupations allied to Engineering. It embraces liberal and technical instruction in the mathematical, physical, and graphical sciences, and their applications, in practical field engineering, in the arts of design and construction, and in the use of tools, materials and machinery, and in processes. This course leads to the degree of *Bachelor of Science in Engineering*.

# Studies of the Course in Arts.

Elective studies must be so chosen as not to interfere with those which are prescribed.

## Freshman Year.

### FIRST SEMESTER.

*Prescribed.*—Latin, 4; French, 4; Mathematics, 4; History, 4; Elocution, 2; Natural History, 2. Total, 20 Periods.

*Extras.*—Drawing and Painting, 4=2; History, 2.

### SECOND SEMESTER.

*Prescribed.*—Latin, 4; German, 4; Mathematics, 4; Rhetoric, 2; History, 4; Natural History, 2. Total, 20 Periods.

*Extras.*—Drawing and Painting, 4=2; Elocution, 2.

## Sophomore Year.

### FIRST SEMESTER.

*Prescribed.*—Greek, 4; Latin, 4; German, 4; Mathematics, 4; Physics, 2; Natural History, 2. Total, 20 Periods.

*Extras.*—Drawing and Painting, 4=2; Elocution, 2.

### SECOND SEMESTER.

*Prescribed.*—Greek, 4; Latin, 4; French, 4; Physics, 2; Natural History, 2; Electives, 4. Total, 20 Periods.

*Electives.*—History, 4; English, 4; Descriptive Astronomy, 2; Elocution, 2.

*Extras.*—Drawing and Painting, 4=2.

## Junior Year.

### FIRST SEMESTER.

*Prescribed.*—Greek, 4; Latin, 4; Chemistry, 4; Electives, 8. Total, 20 Periods.

*Electives.*—German, 4; History, 4; English, 4; Physics, 4; Biology, 6=4; Pedagogics, 2.

*Extras.*—Drawing and Painting, 2; Elocution, 2.

### SECOND SEMESTER.

*Prescribed.*—Greek, 4; Latin, 4; History, 4; Electives, 8. Total, 20 Periods.

*Electives.*—French, 4; English, 4; Chemistry, 4; Physics, 4; Biology, 6=4; Pedagogics, 2; Elocution, 2.

*Extras.*—Drawing and Painting, 2.

## Senior Year.

### FIRST SEMESTER.

*Prescribed.*—Greek, 4; Mental and Moral Philosophy, 4; Political Science, 4; Logic, 2; Elocution, 2; Electives, 4. Total, 20 Periods.

*Electives.*—Latin, 4; Chemistry, 8=4; English, 4; French, 4; Biology, 6=4; Pedagogics, 2; Mineralogy, 2.

*Extras.*—Drawing and Painting, 2.

### SECOND SEMESTER.

*Prescribed.*—Greek, 4; Mental and Moral Philosophy, 4; Geology, 2; Elocution, 2; Electives, 8. Total, 20 Periods.

*Electives.*—Latin, 4; Chemistry, 8=4; English, 4; German, 4; Political Science, 4; Biology, 6=4; Pedagogics, 2; Mineralogy, 2.

*Extras.*—Drawing and Painting, 2.

Physical Culture is required of all

Essays are required throughout the course.

# Studies of the Course in Letters.

Elective studies must be so chosen as not to interfere with those which are prescribed.

## Freshman Year.

### FIRST SEMESTER.

*Prescribed.*—French, 4; Mathematics, 4; English, 4; History, 4; Elocution, 2; Natural History, 2. Total, 20 Periods.

*Extras.*—Drawing and Painting, 4=2.

### SECOND SEMESTER.

*Prescribed.*—German, 4; Mathematics, 4; English, 4; Rhetoric, 2; Natural History, 2; History, 4. Total, 20 Periods.

*Extras.*—Drawing and Painting, 4=2; Elocution, 2.

## Sophomore Year.

### FIRST SEMESTER

*Prescribed.*—German, 4; Mathematics, 4; English, 4; Physics, 2; Natural History, 2; Electives, 4. Total, 20 Periods.

*Electives.*—Latin, 4; Elocution, 2; History, 2.

*Extras.*—Drawing and Painting, 4=2.

### SECOND SEMESTER.

*Prescribed.*—French, 4; History, 4; English, 4; Physics, 2; Natural History, 2; Electives, 4. Total, 20 Periods.

*Electives.*—Latin, 4; Descriptive Astronomy, 2; Elocution, 2.

*Extras.*—Drawing and Painting, 4=2.

## Junior Year.

### FIRST SEMESTER.

*Prescribed.*—English, 4; History, 4; German, 4; Chemistry, 4; Electives, 4. Total, 20 Periods.

*Electives.*—Latin, 4; Physics, 4; Biology, 6=4; Pedagogics, 2; Elocution, 2.

*Extras.*—Drawing and Painting, 2.

### SECOND SEMESTER.

*Prescribed.*—English, 4; History, 4; French, 4; Electives, 8. Total, 20 Periods.

*Electives.*—Latin, 4; Chemistry, 6=4; Physics, 4; Biology, 6=4; Pedagogics, 2; Elocution, 2.

*Extras.*—Drawing and Painting, 2.

## Senior Year.

### FIRST SEMESTER.

*Prescribed.*—English, 4; Mental and Moral Philosophy, 4; Political Science, 4; Logic, 2; Elocution, 2; Electives, 4. Total, 20 Periods.

*Electives.*—Latin, 4; French, 4; Biology, 6=4; Mineralogy, 2; Pedagogics, 2.

*Extras.*—Drawing and Painting, 2.

### SECOND SEMESTER.

*Prescribed.*—English, 4; Mental and Moral Philosophy, 4; German, 4; Geology, 2; Elocution, 2; Electives 4. Total, 20 Periods.

*Electives.*—Latin, 4; Political Science, 4; Biology, 6=4; Mineralogy, 2; Pedagogics, 2.

*Extras.*—Drawing and Painting, 2.

Physical Culture is required of all.

Essays are required throughout the course.

# Studies of the Course in Science.

Elective studies must be so chosen as not to interfere with those which are prescribed.

## Freshman Year.

### FIRST SEMESTER.

*Prescribed.*—Chemistry, 4; Mathematics, 4; French, 4; History, 4; Natural History, 2; Elocution, 2. Total, 20 Periods.

*Extras.*—Drawing and Painting, 4=2.

### SECOND SEMESTER.

*Prescribed.*—History, 4; Chemistry, 6=4; Mathematics, 4; German, 4; Rhetoric, 2; Natural History, 2. Total, 20 Periods.

*Extras.*—Drawing and Painting, 4=2; Elocution, 2.

## Sophomore Year.

### FIRST SEMESTER.

*Prescribed.*—Chemistry, 8=4; Mathematics, 4; German, 4; Physics, 2; Natural History, 2; Electives, 4. Total, 20 Periods.

*Electives.*—English, 4; Elocution, 2; History, 2.

*Extras.*—Drawing and Painting, 4=2.

### SECOND SEMESTER.

*Prescribed.*—Chemistry, 8=4; Mathematics, 4; Mechanics, 4; Physics, 2; Natural History, 2; Electives, 4. Total, 20 Periods.

*Electives.*—English, 4; French, 4; History, 4; Elocution, 2; Descriptive Astronomy, 2.

*Extras.*—Drawing and Painting, 4=2.

## Junior Year.

### FIRST SEMESTER.

*Prescribed.*—Physics, 4; Chemistry, 8=4; Biology, 6=4; German, 4; Electives, 4. Total, 20 Periods.

*Electives.*—Mathematics, 4; History, 4; Pedagogics, 2; Elocution, 2; English, 4.

*Extras.*—Drawing and Painting, 2.

### SECOND SEMESTER.

*Prescribed.*—Physics, 4; Chemistry, 8=4; Biology, 6=4; Electives, 8. Total, 20 Periods.

*Electives.*—Mathematics, 4; History, 4; English, 4; French, 4; Pedagogics, 2; Elocution, 2.

*Extras.*—Drawing and Painting, 2.

## Senior Year.

### FIRST SEMESTER.

*Prescribed.*—Chemistry, 8=4; Mental and Moral Philosophy, 4; Political Science, 4; Logic, 2; Elocution, 2; Electives, 4. Total, 20 Periods.

*Electives.*—Physics, 6=4; Biology, 6=4; French, 4; Mineralogy, 2; Pedagogics, 2.

*Extras.*—Drawing and Painting, 2.

### SECOND SEMESTER.

*Prescribed.*—Mental and Moral Philosophy, 4; Chemistry, 8=4; Geology, 2; Elocution, 2; Electives, 8. Total, 20 Periods.

*Electives.*—Biology, 6=4; Political Science, 4; Physics, 6=4; German, 4; Mineralogy, 2; Pedagogics, 2.

*Extras.*—Drawing and Painting, 2.

Physical Culture is required of all.

Essays are required throughout the course.

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# Studies of the Course in Engineering.

Elective studies must be so chosen as not to interfere with those which are prescribed.

## Freshman Year.

### FIRST SEMESTER.

*Prescribed.*—Engineering Practice, 3; Draughting, 6=3; Mathematics, 4; Chemistry, 4; Natural History, 2; Electives, 4. Total, 20 Periods.

*Electives.*—History, 4; English, 4.

*Extras.*—Drawing and Painting, 2.

### SECOND SEMESTER.

*Prescribed.*—Engineering Practice, 3; Draughting, 6=3; Mathematics, 4; Chemistry, 6=4; Rhetoric, 2; Electives, 4. Total, 20 Periods.

*Electives.*—German, 4; English, 4; History, 4.

*Extras.*—Drawing and Painting, 2.

## Sophomore Year.

### FIRST SEMESTER.

*Prescribed.*—Descriptive Geometry and Surveying, 4; Engineering Practice, 2; Draughting, 4=2; Mathematics, 4; Chemistry, 6=2; Physics, 2; Electives, 4. Total, 20 Periods.

*Electives.*—German, 4; English, 4.

*Extras.*—Drawing and Painting, 2; Elocution, 2.

### SECOND SEMESTER.

*Prescribed.*—Mechanics, 4; Engineering Practice, 2; Draughting, 4=2; Mathematics, 4; Chemistry, 6=2; Physics, 2; Electives, 4. Total, 20 Periods.

*Electives.*—French, 4; History, 4; English, 4; Elocution, 2; Descriptive Astronomy, 2.

*Extras.*—Drawing and Painting, 2.

## Junior Year.

### FIRST SEMESTER.

*Prescribed.*—Engineering, 6; Engineering Practice, 6=2; Mathematics, 4; Physics, 4; Electives, 4. Total, 20 Periods.

*Electives.*—Chemistry, 8=4; German, 4.

*Extras.*—Drawing and Painting, 2; Pedagogics, 2; Elocution, 2.

### SECOND SEMESTER.

*Prescribed.*—Engineering, 6; Engineering Practice, 2; Mathematics, 4; Physics, 4; Electives, 4. Total, 20 Periods.

*Electives.*—Chemistry, 8=4; History, 4.

*Extras.*—Drawing and Painting, 2; Pedagogics, 2; Elocution, 2.

## Senior Year.

### FIRST SEMESTER.

*Prescribed.*—Engineering, 8; Engineering Practice, 9=4; Elocution, 2; Logic, 2; Electives, 4. Total, 20 Periods.

*Electives.*—Astronomy, 4; English, 4; Chemistry, 8=4; Physics, 6=4; Mineralogy, 2; Pedagogics, 2.

*Extras.*—Drawing and Painting, 2.

### SECOND SEMESTER.

*Prescribed.*—Engineering, 8; Engineering Practice, 9=4; Elocution, 2; Geology, 2; Electives, 4. Total, 20 Periods.

*Electives.*—Astronomy, 4; English, 4; Chemistry, 8=4; Physics, 6=4; Mineralogy, 2; Pedagogics, 2.

*Extras.*—Drawing and Painting, 2.

Physical Culture is required of all.

Essays are required throughout the course.

## Studies of the Sub-Collegiate Class.

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### Course in Arts.

#### FIRST SEMESTER.

Latin, 4; Mathematics, 4; English, 4; French (throughout the year), 4—or German (throughout the year), 4; Reading, 4. Total, 20 Periods.

#### SECOND SEMESTER.

Latin, 4; Mathematics, 4; Freehand Drawing, 4; French (throughout the year), 4—or German (throughout the year), 4; Writing and Spelling, 4. Total, 20 Periods.

### Course in Science.

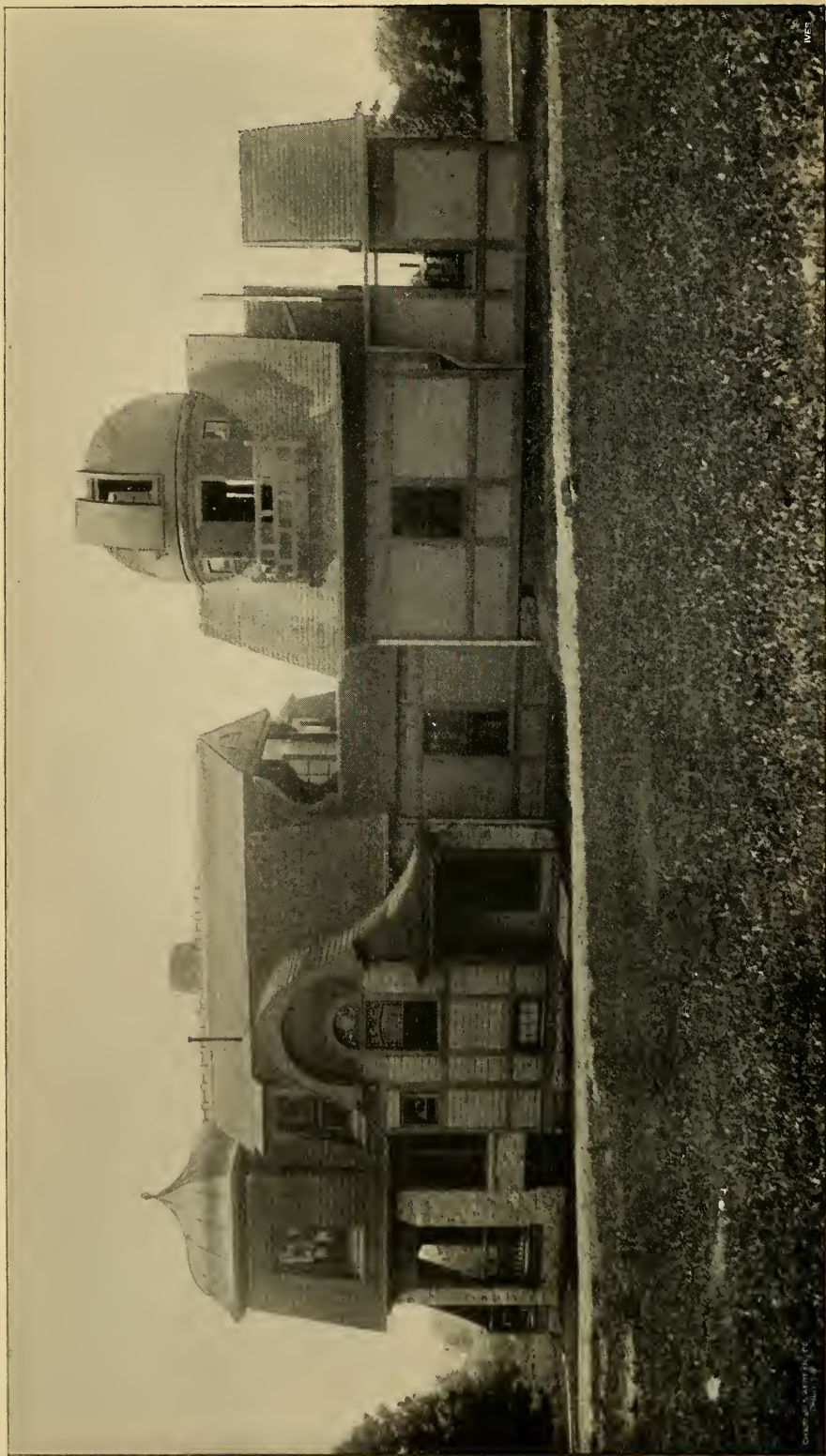
#### FIRST SEMESTER.

Draughting, 8=4; Mathematics, 4; English, 4; French (throughout the year), 4—or German (throughout the year), 4; Writing and Spelling, 4. Total, 20 Periods.

#### SECOND SEMESTER.

Shop-work, 4=2; English, 2; Mathematics, 4; French (throughout the year), 4—or German (throughout the year), 4; Freehand Drawing, 4; Reading, 4. Total, 20 Periods.





ASTRONOMICAL OBSERVATORY

## Graduation and Degrees.

As a condition of graduation, each student must submit to the Faculty a satisfactory Oration or Essay, which he must be prepared to deliver in public, if required to do so.

### The Degree of Bachelor.

The Degrees of Bachelor of Arts, of Letters, and of Science are conferred on the completion of the corresponding courses.

### The Degree of Master.

Candidates for the Master's Degree are required to pursue a course of study at Swarthmore, or elsewhere, under the direction of the Faculty, and to pass examination in the same. Persons residing at the College and devoting their whole time to the work can accomplish a sufficient amount in one year; for non-resident candidates, who are at the same time engaged in other work, the course must occupy not less than two years.

Application should be made directly to the Faculty, and should state the subject or subjects in which the applicants wish to present themselves. Work will then be assigned to them by the Faculty.

The Examinations for the Degrees will be both oral and written, and will be conducted by a committee of the Faculty, upon whose report the Faculty will decide upon the fitness of the candidate for the Degree.

An extended thesis, bearing upon some part of the work assigned, will in all cases be required.

The Degree of A.M. will be given to Bachelors of Arts who comply with the above conditions.

The Degree of M.L. will be given to Bachelors of Letters who comply with the above conditions.

The Degree of M.S. will be given to Bachelors of Science who comply with the above conditions.

## The Degree of Civil Engineer.

The Degree of C.E. will be conferred upon Bachelors of Science of the Engineering Department who shall have been engaged for not less than three years, in successful professional practice, in positions of responsibility, and who shall present an acceptable thesis upon a subject pertaining to Engineering.

Application for this Degree must be made, and the thesis presented, at least *three months* before commencement.

## Degrees Conferred in 1890.

At the Commencement in 1890, Degrees were conferred upon the following Graduates:

### Bachelor of Arts.

ALVAN WILLIAMS ATKINSON . . . . .	Buckingham, Pa.
SARA HICKS ATKINSON . . . . .	Holicong, Pa.
BEULAH WALTER DARLINGTON . . . . .	Darling, Pa.
GEORGE ELLSLER . . . . .	Baltimore, Md.
CAROLINE ROSALIND GASTON . . . . .	Honey Brook, Pa.
ABBY MARY HALL . . . . .	Swarthmore, Pa.
CLARA ADELIA HUGHES . . . . .	Lima, Ohio.
FRANCES EGGLESTON OTTLEY . . . . .	Austin, Tex.
MARY DARLINGTON PALMER . . . . .	Ward, Pa.
JAMES WAPLES PONDER . . . . .	Milton, Del.
WALTER ROBERTS . . . . .	Moorestown, N. J.
FRANCES BRIGGS SMITH . . . . .	Swarthmore, Pa.
R. BARCLAY SPICER . . . . .	Baltimore, Md.
WILLIAM ELLERY SWEET . . . . .	Colorado Springs, Col.
MARY HAYES WHITE . . . . .	Lansdowne, Pa.



## Bachelor of Letters.

MARTHA MCILVAIN BIDDLE . . . . .	Riverton, N. J.
MARY ELIZABETH PANCOAST . . . . .	Marple, Pa.
ALICE WILLETS TITUS . . . . .	Old Westbury, N. Y.

## Bachelor of Science.

### IN SCIENCE.

GEORGE HIBBERD BARTRAM . . . . .	Milltown, Pa.
EMMA JUDITH BROOMELL . . . . .	Baltimore, Md.
MORRIS LEWIS CLOTHIER . . . . .	Wynnewood, Pa.
SAMUEL ROBERTS LIPPINCOTT . . . . .	Cinnaminson, N. J.
WILLARD LORRAINE MARIS . . . . .	West Chester, Pa.
MARY FLORENCE SOPER . . . . .	Jersey City, N. J.

### IN ENGINEERING.

EDWARD DARLINGTON . . . . .	Darling, Pa.
WILLIAM DUNTON LIPPINCOTT . . . . .	Cinnaminson, N. J.
ROBERT STEFFAN McCONNELL . . . . .	Philadelphia, Pa.
ELLIS BRANSON RIDGWAY . . . . .	Coatesville, Pa.
RICHARD CHASE SELLERS . . . . .	Swarthmore, Pa.

## Master of Science.

T. MONTGOMERY LIGHTFOOT, B.S., 1888 . .	Germantown, Pa.
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## HONORARY DEGREE.

### Bachelor of Arts.

OLIVIA RODHAM . . . . .	Berlin, Germany.
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# Officers of the Alumni Association.

INCORPORATED 1882.



## President.

JAMES E. VERREE, '83 . . . . Cor. 8th & Market Sts., Phila., Pa.

## Vice-Presidents.

HOWARD W. LIPPINCOTT, '75 . . Drexel Building, Phila., Pa.

MARY E. GALE, '82 . . . . Germantown, Pa.

S. DUFFIELD MITCHELL, '83 . . West Chester, Pa.

## Secretary.

ELLA MERRICK, '86 . . . . Moorestown, N. J.

## Treasurer.

JOSEPH T. BUNTING, '77 . . . Drexel Building, Phila., Pa.

## Recorder.

HERMAN HOOPES, '74 . . . . 516 Minor St., Phila., Pa.

## Board of Directors.

ELIZABETH C. HOLCOMB, '73 . . Swarthmore, Pa.

HERMAN HOOPES, '74 . . . . 516 Minor St., Phila., Pa.

CAROLINE E. BURR HALL, '78 . Swarthmore, Pa.

WILLIAM G. UNDERWOOD, '87 . Elizabeth City, N. C.

J. RUSSELL HAYES, '88 . . . . West Chester, Pa.

LOUELLA PASSMORE, '89 . . . . Oxford, Pa.

# Graduates.

## Class of 1873.

SARAH H. (ACTON) HILLIARD, A.B. . . . .	Salem, N. J.
HELEN (MAGILL) WHITE, A.B. (Ph.D., Boston University, 1877) . . . . .	Ithaca, N. Y.
ELIZABETH C. (MILLER) HOLCOMB, A.B. . . . .	Swarthmore, Pa.
ESTHER T. MOORE, A.B. . . . .	Swarthmore College, Pa.
*MARIA C. (PIERCE) GREEN, A.B. . . . .	1877.
LOWNDES TAYLOR, A.B. . . . .	St. Paul, Minn.

## Class of 1874.

ELLEN H. (EVANS) PRICE, A.M., 1884 . . . . .	Swarthmore, Pa.
AMY W. (HALL) HICKMAN, A.B. . . . .	West Chester, Pa.
*ALFRED T. HAVILAND, B.S. . . . .	1874.
MARY (HIBBARD) THATCHER, A.B. . . . .	Wilmington, Del.
HERMAN HOOPES, C.E., 1879 . . . . .	Philadelphia, Pa.
FERRIS W. PRICE, A.M., 1887 . . . . .	Swarthmore, Pa.
ELIZABETH S. (WOOLSTON) COLLINS, A.B. . . . .	Germantown, Pa.

## Class of 1875.

JOHN B. BOOTH, A.B. . . . .	Pittsburgh, Pa.
HELEN (COMLY) WHITE, A.B. . . . .	Lansdowne, Pa.
FRANKLIN H. CORLIES, B.S. . . . .	Philadelphia, Pa.
*HERBERT G. DOW, A.B. (and Harvard, 1877) . . . . .	1878.
LIZZIE (HANES) TAYLOR, A.B. . . . .	Woodstown, N. J.
EDITH R. (HOOPER) ROBERTS, A.B. . . . .	Titusville, Pa.
BARTON HOOPES, JR., B.S. . . . .	Philadelphia, Pa.
*OLIVER KEESE, JR., B.S. . . . .	1879.
J. REECE LEWIS, B.S. . . . .	Media, Pa.
HOWARD W. LIPPINCOTT, A.B. . . . .	Philadelphia, Pa.
MARTHA (McILVAIN) EASTWICK, A.B. . . . .	Philadelphia, Pa.
JOHN K. RICHARDS, A.B. (and Harvard, 1877) . . . . .	Ironton, Ohio.
WILLIAM H. RIDGWAY, C.E., 1879 . . . . .	Coatesville, Pa.

## Class of 1876.

FRANK L. BASSETT, B.S. (D.D.S., Phila. Dental College, 1878) . . . . .	Philadelphia, Pa.
ARTHUR W. BRADLEY, A.B. . . . .	St. Paul, Minn.

\* Deceased.

- FRANCES (LINTON) SHARPLESS, A.M., 1881 (M.D., Women's Medical College, Phila., 1886) . . . . . West Chester, Pa.  
 ELIZABETH L. (LONGSTRETH) BOYD, A.B. . . . . Wynnewood, Pa.  
 JAMES T. MCCLURE, B.S. . . . . Philadelphia, Pa.  
 EMMA MCILVAIN, A.B. . . . . Philadelphia, Pa.  
 EDWIN MITCHELL, JR., A.B. (B.L. and B.S.R., Sorbonne, Paris, 1877) . . . . . New York, N. Y.  
 LUCY R. (PRICE) MCINTYRE, A.B. (1880) . . . . . Philadelphia, Pa.  
 ISAAC G. SMEDLEY, B.S. (M.D., Hahnemann Medical College, 1879) . . . . . Philadelphia, Pa.  
 HERBERT W. SMYTH, A.B. (and Harvard, 1878; Ph.D., Göttingen, 1884) . . . . . Bryn Mawr College, Pa.  
 MARY WILLITS, A.M., 1881 (M.D., Women's Medical College, Phila., 1881) . . . . . Philadelphia, Pa.  
 WILLIAM P. WORTH, B.S. . . . . Coatesville, Pa.

### Class of 1877.

- JOSEPH T. BUNTING, B.S. (LL.B., Univ. of Penna., 1880) . Philadelphia, Pa.  
 NORMAN B. CORSON, A.B. . . . . Norristown, Pa.  
 EUDORA MAGILL, A.B. . . . . Swarthmore, Pa.  
 JESSE R. NORTON, A.B. (and Harvard, 1879) . . . . . Ironton, Ohio.  
 CARROLL R. WILLIAMS, A.M., 1882 (LL.B., University of Penna., 1880) . . . . . Philadelphia, Pa.  
 FLORENCE M. YEATMAN, A.B. . . . . Norway, Pa.

### Class of 1878.

- CAROLINE E. (BURR) HALL, A.B. . . . . Swarthmore, Pa.  
 MAYBELL P. DAVIS, A.B. . . . . Newtonville, Mass.  
 HOWARD DAWSON, A.M., 1882 . . . . . Boston, Mass.  
 TACY A. (GLEIM) DUNNING, A.B. . . . . Fort Laramie, Wyoming.  
 WILLIAM J. HALL, B.S. . . . . Swarthmore College, Pa.  
 MARY P. (HALLOWELL) HOUGH, A.M., 1881 (Women's Medical College, Phila., 1881) . . . . . Ambler, Pa.  
 CHARLES A. HAWKINS, A.B. . . . . York, Pa.  
 WILLIAM PENN HOLCOMB, M.L., 1882 (Ph.D., Johns Hopkins Univ., 1886) . . . . . Swarthmore College, Pa.  
 REBECCA S. (HUNT) WHITE, A.M., 1881 (M.D., Women's Medical College, Phila., 1881) . . . . . Philadelphia, Pa.  
 ANNA E. (JACKSON) MONAGHAN, B.L. . . . . West Chester, Pa.  
 LLEWELLYN H. JOHNSON, B.S. . . . . Orange, N. J.  
 EDWARD MARTIN, A.M., 1882 (M.D., University of Penna., 1883) . . . . . Philadelphia, Pa.  
 FRANCIS J. PALMER, B.S. . . . . Brooklyn, N. Y.  
 ISRAEL ROBERTS, B.S. . . . . Camden, N. J.  
 WILLIAM SEAMAN, C.E., 1884 . . . . . Wilmington, Del.  
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CHARLES R. MILLER, B.L. (LL.B., University of Penna., 1881) . . . . .	Wilmington, Del.
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MYRA T. HILLMAN, A.B. . . . .	Washington, D. C.
EMILY L. (HOUGH) SAVIDGE, A.B. (and Univ. of Minn., 1881) . . . . .	Kearney, Neb.
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GEORGINE (KURTZ) MUHLENBERG, A.B. . . . .	Reading, Pa.
ALBERT R. LAWTON, A.M., 1885 . . . . .	New York, N. Y.
ROBERT J. MARCHER, B.S. . . . .	High Bridge, N. Y.
THOMAS L. MOORE, A.B. . . . .	Richmond, Va.
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MARTHA E. (RHINOEHL) OSBORN, A.B. . . . .	Philadelphia, Pa.
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HENRY B. SEAMAN, C.E., 1884 . . . . .	Brooklyn, N. Y.
CHARLES E. SHARPLESS, C.E., 1884 . . . . .	Philipsburg, Pa.
ALVIN T. SHOEMAKER, B.L. . . . .	New York, N. Y.
I. BYRON THOMAS, B.S. . . . .	Woodbury, N. J.
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WILLIAM BUTLER, JR., A.B. . . . .	West Chester, Pa.
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MARY E. GALE, A.B. . . . .	Germantown, Pa.
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MARGARET E. HALLOWELL, A.B. . . . .	Lansdowne, Pa.
ELIZABETH E. HART, B.L. . . . .	Doylestown, Pa.
ELIZABETH HASLAM, B.L. . . . .	Philadelphia, Pa.
ELIZABETH M. OGDEN, B.L. . . . .	West Chester, Pa.
CHARLES PALMER, A.M., 1885 . . . . .	Chester, Pa.
*GEORGE C. PHILLIPS, B.S. . . . .	1883.
HORACE L. ROSSITER, A.B. . . . .	Girard, Pa.
CHARLES B. TURTON, B.S. . . . .	New York, N. Y.
GERRIT E. H. WEAVER, A.B. (and Harvard, 1884), A.M., 1886 . . . . .	Swarthmore College, Pa.
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GUION MILLER, A.M., 1888 . . . . .	Washington, D. C.
S. DUFFIELD MITCHELL, A.B. . . . .	West Chester, Pa.
EDWARD A. PENNOCK, A. B. . . . .	Chatham, Pa.
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\* Deceased.



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EMMA (WEBB) PRICE, A.B. . . . .	Philadelphia, Pa.

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P. SHARPLES HALL, B.S. . . . .	Hahnemann Medical Col- lege, Phila., Pa.
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J. RUSSELL HAYES, A.B. (and Harvard University, 1889)	University of Penna.
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T. MONTGOMERY LIGHTFOOT, M.S., 1890 . . . . .	Philadelphia, Pa.
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WILLIAM S. MARSHALL, B.S. . . . .	Leipsic, Germany.
AARON C. PANCOAST, B.S. . . . .	San Antonio, Texas.
JESSIE PYLE, A.B. (and Cornell University, 1889) . . . . .	London Grove, Pa.
JOSEPH J. RHOADS, B.S. . . . .	Bellefonte, Pa.
KATHERINE M. RIDER, B.L. . . . .	Brooklyn, N. Y.
WILLIAM H. SEAMAN, B.S. . . . .	Jericho, N. Y.
AMELIA SKILLIN, A.B. . . . .	Moorestown, N. J.
CARROLL H. SUDLER, A.B. . . . .	Philadelphia, Pa.
CHARLOTTE M. WAY, B.S. . . . .	Tempe, Arizona.
ANNIE E. WILLITS, A.B. . . . .	Syosset, N. Y.
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## Class of 1889.

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HORACE B. FORMAN, JR., B.S. . . . .	Graham, W. Va.

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CLARA HAYDOCK, B.L. . . . .	New York, N. Y.
J. CARROLL HAYES, A.B. (and Harvard Univ., 1890) . . .	University of Penna.
JULIA HICKS, B.S. . . . .	Old Westbury, N. Y.
MARY KIRK, A.B. . . . .	New York, N. Y.
MARGARET J. LAURIE, A.B. . . . .	Jericho, N. Y.
GEORGE A. MASTERS, B.S. . . . .	Philadelphia, Pa.
ALICE S. PALMER, A.B. . . . .	West Chester, Pa.
LOUELLA PASSMORE, A.B. . . . .	Oxford, Pa.
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RALPH STONE, A.B. . . . .	University of Michigan.
ELSIE D. STONER, B.L. . . . .	Philadelphia, Pa.
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MORRIS L. CLOTHIER, B.S. . . . .	Wynnewood, Pa.
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EDWARD DARLINGTON, B.S. . . . .	Media, Pa.
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MARY H. WHITE, A.B. . . . .	Lansdowne, Pa.

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1888.

WILLIAM HYDE APPLETON (A.B., Harvard, 1864; A.M., LL.B., Harvard, 1869), Ph.D., Professor of Greek and of English Literature.

SUSAN J. CUNNINGHAM, Sc.D., Professor of Mathematics and Astronomy.

1889.

ARTHUR BEARDSLEY (C.E., Rensselaer Polytechnic Institute, 1867), Ph.D., Professor of Engineering and Director of Mechanic Arts.

ISAAC SHARPLESS (B.S., Harvard, 1873; Sc.D., University of Pennsylvania, 1883), LL.D., President of Haverford College.

1890.

OLIVIA RODHAM, A.B., late Assistant Librarian and Instructor in Botany.

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314 Vine Street, Philadelphia, Pa.

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